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IMPLEMENTATION PLAN REVIEW FOR OREGON REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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IMPLEMENTATION PLAN REVIEW
FOR
OREGON
REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

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U. S. Environmental Protection Agency
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1.0 EXECUTIVE SUMMARY

The enclosed report is the U. S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallels EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where

this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are: 1) the use of the example region approach in developing State-wide air quality control strategies; 2) the existence of State Air Quality Standards which are more stringent than NAAQS; and 3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can

result in a regulation requiring one percent sulfur oil to be burned statewide where the use of three percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based is the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of quality air. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution problems such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerance within each of the various AQCR's. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D, and E.

The major findings evolving from the study are:

- The review indicates that SO_2 emission regulations may be revised in all the regions except the Northwest AQCR and the Portland Interstate (Oregon portion) without jeopardizing attainment and maintenance of NAAQS. For the Portland Interstate, it is probable that SO_2 emission regulations can be revised in areas removed from the Portland Metro AQMA. The review also indicates that present fuel burning practices are in significant over-compliance with SO_2 emission regulations (due to the use of natural gas and fuel oils with sulfur content significantly below the allowable ceiling levels), and that there is room to increase SO_2 emissions before violating the emission regulations in each of the AQCRs.

- Clean fuel savings policies which would result in permittable increase in SO_2 emissions should be implemented with caution in regions where attainment and maintenance problems exist for particulate ambient air standards. Increased particulate emissions, and increased levels of secondary particulates from SO_2 precursors, resulting from use of higher sulfur fuels, would

jeopardize maintenance or attainment problems for particulate ambient air standards in the AQMAS of the Portland Interstate and Southwest AQCRS, and in the area of worst air quality in the Eastern AQCR. Therefore, policies which would allow use of higher sulfur fuels would also necessitate additional control equipment to counter the increased particulate emissions.

- Particulate emission regulations appear to be overly restrictive only in the Central AQCR. Air standards maintenance and attainment problems in the Portland Interstate, Southwest, and Eastern AQCRS indicate that fuel combustion emission regulations should not be revised there, except possibly for sources in cleaner portions of the regions removed from the areas of worst air quality. Revision of particulate emission regulations in the Northwest AQCR would only jeopardize maintenance of the federal air quality standards there.

- Due to natural gas curtailments, and potential conversions from wood burning, the use of fuel oils is expected to increase dramatically in the State of Oregon in the next few years. This fuel schedule change will hasten maintenance problems for compliance with SO_2 air quality standards in the Northwest AQCR, and the Portland Interstate AQCR, but is not expected to conflict with clean air goals in other regions.

- The impact on air quality of plausible fuel switches for clean fuel savings in the State of Oregon would appear to be relatively insignificant insofar as particulate emissions increases are concerned. However, such fuel switches would hasten air quality maintenance problems in all regions except the Central and Northwest AQCRS. The review indicates the impact of such fuel switches on SO_2 emissions would be significant, and would probably jeopardize the maintenance of SO_2 air quality standards in both the Portland Interstate AQCR and the Northwest AQCR.

- Areas in which SO_2 or particulate emission regulations may be revised without jeopardizing attainment or maintenance of federal air standards, are candidates for clean fuel savings. In addition there are regions where significant fuel savings may be accomplished within the constraints of the regulation emission limits, and without jeopardizing attainment of federal air standards. The review analysis indicates that SO_2 emissions may be increased significantly (to obtain clean fuel savings) without violation of emission regulations or interference with attainment of air quality standards in all regions except the Portland Interstate and Northwest AQCRS. The analysis also shows that by 1975, particulate emissions may be increased significantly in the Central and Northwest AQCRS, and probably in portions of the Portland Interstate, Eastern, and Southwest AQCRS before violating emissions regulations. Hence, potential clean fuel savings programs which would result from fuel switches causing increased emissions of particulates could be devised to be compatible with both the emission regulations or the ambient air quality standards in all regions (or in portions of regions).

2.0 STATE IMPLEMENTATION PLAN REVIEW

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State initiated action to modify combustion emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on reported (1973) air quality data, does air quality meet NAAQS?
- Based on reported (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Based on the State Implementation Plan, are there indications of a tolerance for increasing emissions in 1975?
- Are the total emissions from stationary fuel combustion sources less than those from all other sources?
- Must emission regulations be revised to accomplish significant fuel switching?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?
- Is there a significant clean fuels savings potential in the region?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations is then determined by a consideration of the air quality indications represented in the responses to the above questions.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices

Table 2-1. Summary of State Implementation Plan Review for Oregon

"INDICATORS"	STATE		CENTRAL AQCR		EASTERN AQCR		NORTHWEST AQCR		PORTLAND INTERSTATE AQCR		SOUTHWEST AQCR	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	No[f]	Yes										
• Does the State have emission limiting regulations for control of:												
1. Power plants	Yes	Yes										
2. Industrial sources	Yes	Yes										
3. Area sources	Yes[g]	Yes										
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	Yes	Yes										
• Has the State initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	No	No										
• Are there proposed Air Quality Maintenance Areas?			No	No	No	No	No	No	Yes	Yes	Yes	No
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Is there an expected 1975 attainment date for NAAQS?			Yes	Yes[c]	Yes	Yes[c]	Yes[c]	Yes[c]	Yes	Yes[c]	Yes[c]	Yes[c]
• Based on reported (1973) Air Quality Data, does air quality meet NAAQS?			No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
• Based on reported (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
• Based on the State Implementation Plan, are there indications of a tolerance for increasing emissions in 1975?			Yes	Yes	Yes[a]	Yes	Yes	Yes	Yes[a]	Yes	Yes	Yes
• Is the fraction of total emissions arising from stationary fuel combustion sources lower than from all other sources combined.			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?	← No Modeling Results Available →											
• Do emission regulations need to be relaxed to obtain significant clean fuel savings?			Yes	No	Yes	No	No	No	Yes	No	Yes	No
• Based on the above indicators and the analysis contained in the report, what is the potential for revising fuel combustion source emission regulations?			Good	Good	Marginal[b]	Good	Good	Poor	Marginal[b]	Marginal[b]	Marginal[b]	Good
• Is there a significant Clean Fuels Saving[d] potential in the region?			Yes	No[e]	No	No[e]	Yes	Yes	No	Yes	No	Yes

[a] A "yes" assessment in these instances indicates there are various counties within the region which are expected to possess an emission tolerance in 1975. These counties are removed from the areas where worst air quality levels are recorded.

[b] The region has been rated "marginal" rather than "poor," because some portions (or counties) of the region are able to tolerate regulation revisions without jeopardizing attainment of federal air standards.

[c] This refers to AQCRs where ambient concentrations are already (as of 1973) in compliance with federal air quality standards.

[d] "Clean fuel savings" refers to the replacement of current fuel schedules with "dirtier" fuels. (Whenever emissions from fuel burning sources can be increased without jeopardizing attainment of NAAQS. It may be plausible that fuel resources allocations can be altered for "clean fuel savings.")

[e] A "No" assessment has been assigned because a relatively insignificant quantity of the regional SO_2 fuel combustion emissions are generated by controllable point sources (nearly all SO_2 emissions are generated by controllable point sources (nearly all SO_2 emissions from fuel burning operations derive from area source emitters, the majority of which are exempt from control regulations because of economic considerations).

[f] The State has adopted a single set of standards for ambient particulate concentrations which are the same as the federal secondary standards.

[g] Area source fuel combustion emission regulations apply to commercial boilers. Many area fuel burning sources (residential space heating units) are exempt from particulate emission control.

provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulations. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendix C, D and E.

Based on an overall evaluation of EPA's current information, AQCR's have been classified as good, marginal, or poor candidates for regulation revisions. The following table summarizes the State Implementation Plan Review. The remaining portion of the report supports this summary with explanations.

2.1 AIR QUALITY SETTING - STATE OF OREGON

The following discussion provides a characterization of the various AQCR's in terms of air quality. It includes an examination of ambient air standards, emission inventories, and air-monitoring networks.

2.1.1 Air Quality Control Regions

The State of Oregon has been divided into five federal air quality control regions to provide a basis for the adoption of regional air quality standards and the implementation of these standards. One of these regions is interstate and includes adjacent counties of Washington and Oregon. The five regions and their boundaries are shown in Figure A-1.

Implementation of control measures to accomplish the federal air quality standards throughout the State of Oregon is a shared responsibility of the Department of Environmental Quality and two air pollution authorities (the Mid-Willamette Valley Air Pollution Authority and the Lane Regional Air Pollution Authority). The jurisdictional areas of these air pollution authorities are all contained within the Oregon portion of the Portland Interstate Air Quality Control Region. The remaining implementation of control strategies in air quality control regions is a responsibility of the State Department of Environmental Quality.

The air pollution priority classification for each of the air quality control regions for particulates, SO_2, and NO_x, is presented in Table A-1. Table A-1 also provides an identification of counties which have been proposed as Air Quality Maintenance Areas. The data indicate the most pressing air pollution problem in the near term and long term involves particulates. Two of the five AQCRs have been proposed as AQMAs for particulates, and only one of the AQCRs was demonstrating air quality meeting federal standards when the air program implementation plans were being formulated. Table A-3 lists the expected attainment dates for federal air quality standards in the various AQCRs.

It should be noted that the Priority I classification for SO_2 in the Portland Interstate AQCR is based on air quality in the Washington portion of the AQCR. Oregon monitoring data, obtained in Portland at the nearest point to the high readings observed in Washington, and other data in the Oregon portion of the Portland Interstate, would indicate a Priority III classification. However, a recent analysis by the Oregon Department of Environmental Quality indicates SO_2 standards will be exceeded by 1977 in the Portland Metro Area (considering projected growth and gas curtailments).

2.1.2 Ambient Air Quality Standards

Ambient Air Standards for the State of Oregon are as shown in Table A-4. The state standards for ambient levels of particulate matter are equivalent to the federal secondary standards. The state standards for atmospheric SO_2 are more stringent than the federal standards.

2.1.3 Air Quality Status

The 1973 air quality status for suspended particulates in the various AQCRs is given in Table A-5. Table A-5 summarizes the worst cases of particulate concentrations for each of the regions in 1973. Violations of the federal air standards for suspended particulates occurred in three of the five AQCRs, and were more severe in terms of the 24-hour basis. Based on region-wide proportional rollback criteria, the regions of Central, Eastern, and the Portland Interstate (Oregon Portion) will each require almost a 30% reduction in region-wide emissions to attain the standards based on the 1973 air quality levels.

As is typical of regions containing both rural and urban areas, the AQCRs in Oregon are subject to uneven distributions of source loading. The uneven distribution causes consistent high particulate measurements at

monitoring sites in the areas of greatest emission density, while the remainder of the region usually reflects a much lower particulate profile. Location of the monitoring site is therefore an important factor in the characterization of regional air quality. If several monitoring sites exist throughout a region, it may be possible to distinguish between areas of different air quality, and further, to formulate separate control strategies applicable to areas within the region.

Data from the air monitoring networks (Table A-6) of the various AQCRs indicate that no violations of the air quality standards for SO_2 occurred in 1973. The highest second highest 24-hour concentrations of SO_2 recorded in any site throughout the State of Oregon was 234 ug/m^3 in the Portland Interstate AQCR. This concentration is well within the allowable level of 365 ug/m^3 permitted by the federal air quality standards. In the remaining four AQCRs, the highest second high 24-hour concentration was 13 ug/m^3. Although the data was insufficient to permit an assessment of the annual average, it is evident that the 80 ug/m^3 annual standard was not violated in any of the AQCRs.

Measurement of SO_2 is performed at nine sites throughout the State. Five of the sites are located in the Portland Interstate AQCR, where sources of SO_2 are more concentrated than anywhere else in the State. Because sources of SO_2 emissions are nearly insignificant in the remaining AQCRs, only one monitoring station is now employed to measure SO_2 in each of these AQCRs.

2.1.4 Emissions Summary

Table A-8 provides a summary of the quantity of particulate emissions generated in each of the AQCRs. The Oregon portion of the Portland Interstate receives substantially more emissions from particulate generating sources than any of the other AQCRs. The Northwest AQCR contains the smallest particulate emission rate, resulting in relatively low concentrations of particulates, well within federal air quality standards. While emissions of particulates in the largest AQCRs, the Central and Eastern Regions, are also relatively small (Table A-8), the manner of distribution of these emissions results in measured air quality indicating a 30% emission rollback requirement to meet standards.

Table A-8 also provides a summary of the quantity and types of fuel combustion particulate emissions in the various AQCRs. It is seen that fuel combustion sources account for 14 to 24% of the total particulate emissions in the various regions. Most of the fuel combustion particulate emissions arise from industrial and commercial point sources. Because nearly all electrical energy consumed by the State of Oregon is generated by hydroelectric power plants, particulate emissions generated from electrical generating facilities are relatively insignificant in all the AQCRs. The quantity of particulate emissions generated by area sources is also relatively small, ranging from 3.5% to 5.5% of the combustion source category particulate emissions.

Table A-7 lists the number of combustion emission sources in each of the AQCRs. These are the number of emission sources which have been inventoried in the NEDS and/or the Federal Power Commission Data System. Only three power plants have been identified as significant emission sources throughout the State. (All of these are in the Portland Interstate AQCR). There are far more industrial-commercial fuel combustion sources, and most of these are wood burning units (which accounts for the fact there are far fewer sources of SO_2 fuel combustion sources listed in Table A-7). Because the burning of waste woods provides a very economical energy source, the wood-burning units would not be likely candidates for fuel revision.

Table A-9 provides a summary of SO_2 emissions generated throughout the various Oregon AQCRs. The role of fuel combustion in SO_2 emissions varies somewhat from region to region. In the Northwest AQCR, fuel combustion sources account for 72.5% of the total SO_2 emissions, while in the Central AQCR, about 45% of the SO_2 emissions originate from fuel burning. As expected, very little SO_2 is generated from power plant activity (predominantly hydro-electric). In most AQCRs, combustion area sources account for the most substantial portion of the SO_2 emissions inventory. This arises primarily from residential space heating and the burning of fuel oils. The quantity of SO_2 emissions from industrial-commercial sources varies from region to region. In the Central and Eastern AQCRs, there are virtually no significant SO_2 emissions arising from industrial combustion sources. The impact of fuel revisions or relaxation of combustion source emission regulations would have

very minor effects on the air quality in these areas. However, in the Northwest, Southwest, and Portland Interstate (Oregon portion) AQCRs, 50%, 26%, and 10 %, of the SO_2 emissions, respectively, generate from industrial and commercial emission sources, and it is expected that air quality in these regions could be affected by either a change in fuel burning schedules, or a relaxation in regulations.

2.2 BACKGROUND ON THE DEVELOPMENT OF THE STATE IMPLEMENTATION PLAN

This section provides a characterization of the Implementation control strategies, a reconciliation evaluation between air quality/emissions relationships assumed at the time of the strategy development and those which can be assumed from more recent data, and an evaluation of the tolerance each of the AQCRs possesses for increased emissions of particulates and SO_2.

2.2.1 General

The State of Oregon developed a control plan for achievement of the federal air standards for particulates and SO_2 by addressing specific air pollution problems in "example regions" possessing the poorest air quality. The impact of candidate control strategies were investigated by developing projected emission inventories, and calculating emission reductions expected to result from application of the strategies. Control strategies which were proven adequate for the example regions (Portland Interstate and Southwest AQCRs) were applied to the remaining regions, with the assumption they would also be adequate to achieve standards there.

The plan development relied in general on simple proportional model roll-back calculations to demonstrate attainment for each of the regions. It was recognized that such calculations do not reflect the influence of topography, meteorology, the distribution of emission sources, and stack heights. Because the required emissions rollback for region-wide emissions is based on the measurement of air quality in an area possessing the poorest air quality, it follows that the control strategy to accomplish this rollback is overly restrictive for those areas of the state which are: 1) significantly cleaner than the area of worst air quality, and 2) remote from the area of worst air quality.

A special feature of the Oregon air quality implementation plan is the consideration it provides in recognizing the distinction between "fine" and "total" particulates. Emissions inventoried as fine particulate are considered to be directly related to the measured levels of suspended particulate matter which indicate rollback requirements. Total particulates are considered to include coarse particles which are present in substantial quantities in emission source stack plumes, but which settle and fall out soon after their discharge to the atmosphere. The Oregon air program addresses the control of fine particulates, establishing control measures which will reduce these quantities of particulates by the required rollback percentages. In employing this procedure, the Oregon plan provides for direct control of measured levels of suspended particulate emissions. Typically, most state plans address the total inventory of particulate tonnages, crediting the elimination of the coarse portion (which falls out of the atmosphere) to their control strategy, and to the required emission reduction . Since many emission sources are comprised of large amounts of coarse particles which have substantial impact on tabulated emission tonnages, it follows that the Oregon control strategy is significantly more stringent than others developed by more typical plan formulation procedures.

2.2.2 Particulate Control Strategy

The EPA judged the Implementation Plan of Oregon to be adequate for attainment of standards for particulates and SO_2. State and local regulations have been enacted to assure attainment of the standards by 1975. Table A-3 shows a summary of the attainment dates projected for each region.

The analysis performed by the State of Oregon in the formulation of the Oregon Implementation Plan shows that the secondary standard for particulates will be most difficult to meet in the Eastern AQCR. Based on proportional model rollback calculations performed for the vicinity of worst air quality in the region (Umatilla County), and on crude assumptions of background dust levels, the control strategy of the example region (Southwest AQCR) is expected to provide a 24% reduction of fine particulates, and 46% for total particulates, by mid-1975. A particulate emission reduction of 35% is estimated to be necessary to achieve the standards. The State included as

a portion of the air-program a plan to evaluate monitoring background levels in the area of worst air quality and to apply this information to modify the Implementation Plan for Eastern Oregon if necessary.

Recent analysis by the Oregon Department of Environmental Quality indicates that the particulate control strategy of the Implementation Plan will not be as successful as originally anticipated within the Portland Metro Air Quality Maintenance Area. The annual particulate standard was projected to be achieved by 1975 but the maximum daily standard was projected not to be met. After 1975, air quality is now expected to worsen steadily with the annual particulate standard being exceeded by 1977. This depreciation of air quality will arise from growth of emission sources, and increased use of fuel oils due to gas curtailments. Until the 10-year AQMA plan has been developed for the Portland Metro AQMA, the Department has adopted interim regulations to restrict particulate and SO_2 emission increases. These regulations include restrictions on economic growth, and use of cleaner fuels in proposed installations.

Table A-10 summarizes pertinent data used in the development of the Implementation Plan particulate control strategies. It should be recognized that those air quality measurements selected as the controlling value for rollback determinations were all annual means, which may not represent the most severe values of ambient air standard violations in all of the regions. Measurements of 24-hour averages reported in the Implementation Plan analysis indicate greater violations of the air standards occur on a 24-hour basis. Since the control strategies were formulated on the basis of the annual readings rather than the worst violation values, it follows that the control strategies may reflect an element of "under-design." However it should also be remembered that the Oregon plan was formulated with special consideration to control of fine particulates. This special aspect of the plan provides a significant degree of control greater than that exemplified in other State Implementation Plans judged adequate to attain standards.

The most significant control measure of the overall control strategy adopted by the State of Oregon concerns the control of industrial process emissions. In the example region of the Portland Interstate AQCR, control

of process emissions in the wood products industry alone will achieve the required emissions rollback to meet air quality standards. The Oregon analysis also shows that similar reductions will result from enforcement of industrial process emission regulations in the remaining regions.

2.2.3 Sulfur Oxide Control Strategy

The State of Oregon control strategy for SO_2 differs greatly from that for particulate matter, owing to the fact that virtually all of the regions were in compliance with the national air quality standards for SO_2 when the air program was formulated. The areas where air quality levels most nearly approach the SO_2 standards are in the immediate vicinities of sulfite pulp mills in Salem, Oregon City, and Newberg in Oregon, and Camas, Washington. These areas are all contained within the Portland Interstate AQCR, which has been designated as the example region for SO_2 control strategy development.

The control strategy for sulfur dioxide addresses the two primary sources of SO_2: sulfite pulp mills, and fuel combustion equipment. The principal control measures include:

- Best-technology control of sulfite pulp mill emissions to reduce ambient air sulfur dioxide levels in the specific problem areas.
- Limitations on the sulfur content of fuels, designed to minimize future increases in sulfur dioxide emissions from fuel burning.
- New-source emission standards for large new fuel burning equipment, plus general SO_2 emission standards of the regional authorities.

Although no violations of federal air quality standards for SO_2 have been documented in Oregon, the occurrences of 15 minute averages above the odor threshold of 1300 ug/m^3 are a significant and commonplace air quality problem in Oregon. These occurrences are directly attributable to blow pit exhaust of sulfite pulp mills, estimated at approximately 80 pounds sulfur dioxide per ton of pulp produced. Under the provisions of the State air program, sulfite pulp mill emissions will be limited to 20 pounds per ton of pulp, with the additional limitation on blow pit exhaust to 0.2 pounds sulfur dioxide per minute per ton of pulp.

The effect of control measures for sulfite mills will result in reduction of blow pit emissions by approximately 97%, and overall plant emissions by about 75%. Compliance with the emission standard is required by July, 1974.

In addition to SO_2 emissions from sulfite pulp mills, emissions from combustion of fuel oil are a major source of atmospheric SO_2. In some areas containing fuel combustion sources, an increasing trend has been demonstrated for atmospheric levels of SO_2. The control strategy of the Oregon air program provides for limitation on the sulfur content (1.75%S) of residual fuel oils to mitigate the trend of increasing SO_2 emissions.

Taken as a whole, the Implementation Plan control strategy for sulfur dioxide is expected to be adequate for the purposes of correcting major point-source problems: sulfite pulp mills and the rate of increase of sulfur dioxide emissions from fuel burning. Total sulfur oxide emissions in the Oregon portion of the Portland Interstate AQCR are projected to decrease 6.1% by 1975, primarily as a result of large reductions in the sulfite pulping industry. Similarily, emissions of SO_2 are expected to decrease in each of the remaining AQCRs, although the reductions will be minimal owing to the fact that few significant sources of SO_2 exist in these regions.

It should be noted that, due to growth and gas curtailments, ambient SO_2 levels are expected to exceed the federal standards in the Portland Metro Area by 1977. Interim emission regulations (to be replaced by provisions of the 10-year AQMA plan now being formulated), restricting economic growth and fuel usage, will be employed to mitigate effects of new source SO_2 emissions.

Table A-11 summarizes pertinent data used in the development of the Implementation Plan SO_2 control strategies. The air quality measurements selected as the controlling value for rollback determination were constituted on annual values estimated from a mathematical model for all regions except the Portland Interstate, where SO_2 monitoring data was available.

2.2.4 Emission Tolerance Evaluation

Table A-10 and A-11 provide an assessment of the tolerance which each of the AQCRs possesses for increased emissions of particulates or SO_2. If a region has a tolerance for more emissions, then this indicates: 1) it is possible that fuel burning schedules may be revised so that clean fuel savings may be accomplished, and 2) it is possible that fuel combustion emission regulations may be (but not necessarily) relaxed. The methodology used in calculating the emission tolerance is explained in detail in Tables A-10 and A-11. There are basically two ways in which the tolerance is derived: 1) by a comparison of the allowable region wide emissions with the actual emissions forecast in 1975, using the data from the Implementation Plan analysis, or 2) by a comparison of allowable region wide emissions with the actual 1973 emissions as determined using 1973 air quality/emissions data. The former method is chosen when the Implementation Plan forecasts appear to be reconciliable with recent air quality/emissions data. In this case, forecasts of the plan are considered valid, and used to develop an emissions tolerance. If justified, this method is preferable, since the emission tolerance developed in this way reflects the full impact of the control strategies after their implementation is complete in 1975. The emission tolerance becomes a measure of the degree of "over-cleaning" accomplished by the plan, or in cases where the region was already within air quality standards and did not require additional pollution controls, the tolerance is an expression of the degree of degradation possible before federal air quality standards are jeopardized. However, if irreconcilabilities exist from the comparison of Implementation Plan forecasts with more current air quality and emissions data, it will be necessary to abort the first approach discussed above, and determine the emission tolerance based on 1973 air quality status in the region, which reflects the estimation before many substantial controls have been implemented from the control strategy.

Table A-10 provides a summary of the data used to estimate a particulate emission tolerance for each of the AQCRs. For three of the regions (the Central, Northwest, and Portland Interstate AQCRs), Implementation Plan forecasts appeared to be reconcilable with recent air quality/emissions data. Hence, for the Central and Northwest regions, forecasts of the plan

were considered valid and used to develop an emissions tolerance. For the assessment of the Portland Interstate emissions tolerance, the plan forecast was not used in favor of more recent and reliable information contained in a recent analysis by the State (the analysis showed that there would be no emissions tolerance indicated for the Portland Metro AQMA). For the remaining regions (the Eastern and Southwest AQCRs), recent air quality/emissions data indicates that regionwide allowable particulate emissions are substantially greater than that supposed in the original plan development. Hence, for these regions, emission tolerances were estimated based on 1973 air quality/emissions status.

The tabulations of Table A-10 show that three of the regions (Central, Northwest, and Southwest AQCRs) possess a tolerance for increased emission of particulates. Of these three regions, both the Southwest and Northwest AQCRs were in compliance with federal air standards in 1973. The Central AQCR is expected to come into compliance with air quality standards by 1975, and acquire the emission tolerance shown in Table A-10 by that time. The magnitude of emission tolerance for the Central and Northwest regions is substantial. For example, in the Northwest AQCR, it is estimated that fuel combustion emissions (1973) could be increased by a factor of five without jeopardizing maintenance of the federal air standards.

It should be noted that, due to growth and other factors, ambient levels of particulates are expected to increase and exceed the secondary air quality standards in the AQMA (Medford-Ashland) of the Southwest AQCR. Hence, while there is an indicated tolerance for increased particulate emissions in the Southwest region in 1975, this tolerance will diminish and be non-existent before 1985.

In the Eastern and the Portland Interstate (Oregon portion) AQCRs, there are no emission tolerances indicated. However in each of these regions, and for the Southwest region as well, there is a possibility that some tolerance for increased particulate emissions may exist in geographic areas removed from the areas of poorest air quality. The overall degree of required control indicated for the entire region is predicated on the value of the worst air quality in the entire region. In certain areas of "cleaner"

air quality, remote from significant influence of the emissions arising in the areas of worst air quality, the required rollback control is probably more severe than necessary for attainment (or maintenance) of standards. Hence, it is plausible that some emission tolerance would be possessed by these cleaner areas. (The quantification of these emission tolerances within a region, on an area by area, or source by source basis, are outside the scope of this study.) Unfortunately, the population and emission source activity is often rather limited in these areas, so that despite the fact these areas may possess substantial particulate emission tolerances, the impact of a fuel savings plan in these areas would often be insignificant.

Table A-11 provides a summary of the data used to estimate an SO_2 emission tolerance for each of the AQCRs. Implementation Plan forecasts appeared to be irreconcilable with the more current 1973 air quality/emissions data for all regions except the Central AQCR. Hence, the SO_2 emission tolerance for these four regions has been estimated based on 1973 emissions/air quality information, and does not reflect additional emission reductions which may be achieved by the control strategy by 1975.

Since all regions were in substantial compliance with SO_2 air quality standards, both in 1973 and the baseyear, substantial emission tolerances have been estimated for each of the regions. The estimations of Table A-11 show that SO_2 emission tolerances are large enough to permit present fuel combustion source emissions of SO_2 to increase several times over present levels.

It should be noted that, due to growth and gas curtailments, ambient SO_2 levels are expected to increase steadily and exceed the federal standards in the Portland Metro Area by 1977. Hence, while the emission tolerance in this region may be substantial at the present time, it will diminish and be non-existent by 1977.

2.2.5 Fuel Combustion Emission Regulations Summary

Table A-12 provides a summary of emission regulations for fuel combustion equipment which have been adopted as a part of the control strategy of the Oregon State Air Program Implementation Plan. The regulations are

fairly consistent throughout the state. In all AQCRs except the Portland Interstate, SO_2 emissions from combustion units are limited according to the size of the unit (by heat input) and the fuel type burned. In addition to stack emission limitations, sulfur content in fuels is restricted. In the Portland Interstate AQCR, all fuel combustion units are limited by a single rule - a 1000 ppm stack emission limitation (1.94 lb of $SO_2/10^6$ Btu heat input). Particulate emissions from existing fuel combustion equipment are limited to .2 grain/SCF (.3 lbs/10^6 Btu heat input) in all regions except in the counties of Clackamas, Columbia, Multnomah, and Washington in the Portland Interstate AQCR, where a special limitation applies according to the size of the combustion equipment (see Figure A-2).

2.3 SPECIAL CONSIDERATIONS

This section provides a brief narrative on special considerations which may impact to some degree the final assessments to be developed in this report.

2.3.1 Planned Revisions to the Implementation Plan

The EPA has approved the portions of the Oregon air pollution control strategy for particulates and SO_2. It has been recognized that limited air quality measurements were available at the time of the strategy formulation, and that the plan provides for on-going development of control strategies as may be indicated appropriate by new data obtained from an expanding air monitoring network and special study efforts. This is exemplified in current study efforts to quantify the impact of background dust levels on particulate loadings in the Eastern AQCR. As a result of this study, the State will evaluate the adequacy of regulations scheduled to be implemented under the control strategy of the State air program.

The state of Oregon is developing a 10 year AQMA plan for proposed AQMAs (see Table A-1) in the Southwest and Portland Interstate AQCRs. Regulations evolving from this plan may replace less stringent restrictions (Table A-12) now applicable to the AQMA areas. In the interim, the State has adopted interim regulations to control particulate and SO_2 emissions in

the Portland Metro Area. The interim restrictions apply to all new proposed sources, and in the case of certain proposals for construction of new oil refineries, it appears that the use of cleaner fuels will be mandatory to meet the interim emission restrictions.

2.3.2 Special Problems

The enforcement of regulations limiting particulate emissions from all fuel combustion sources to .2 grain/SCF will force: 1) the use of control equipment on wood burning boilers, or 2) the use of alternative fuels. Currently there are numerous variances to burn wood in violation of the regulation limits because of a fuel shortage problem in Oregon. It is expected that most wood burning operations will be adapted for compliance with particulate regulations by installation of boiler stack emission control equipment.

2.3.3 Fuels and Anticipated Fuel Conversions

The vast majority of energy consumption in the State of Oregon is produced by hydroelectric power plants. Of the current fuel energy used in the State of Oregon in 1972, 33% was petroleum, 45% was natural gas and the remainder (22%) was coal or wood (see Table E-1). This distribution of fuel usage is expected to change substantially over the next few years. The use of fuel oils is expected to increase drastically due to increasing curtailment of Canada's supply of natural gas to the Northern States. This would indicate that a significant portion of the fuel combustion equipment in Oregon will be converted to burn fuel oil, and consequently, emissions of SO_2 and particulates will increase significantly.

Under the imposed gas curtailments (which in effect, amounts to clean fuel savings), it is unclear whether industry will be capable of providing the controls needed to comply with the emission regulations of the control strategies. (Of course this uncertainty is present even if fuel schedules do not change, as many industries are now operating in variance with regulations until they can provide control installations.) Particulate control devices can probably be supplied in time to meet the compliance deadline for particulate control, but a trend toward shortage of low sulfur fuel oils

may create difficult SO_2 regulation compliance problems since increasingly large quantities will be needed (in place of curtailed gas) to meet the regulations. Flue gas desulfurization systems loom as a future SO_2 emission control alternative, but because of their limited application to date, these systems are not expected to be available as a means of meeting the 1975 compliance deadlines.

3.0. AQCR ASSESSMENTS

The fundamental objective underlying the review conducted in this report is to establish if fuel combustion emission levels may be increased without jeopardizing the attainment or maintenance of federal ambient air quality standards. The pursuit of this objective is a necessary prerequisite to the reasonable implementation of national energy goals. If it is determined that emissions from certain fuel burning sources can be increased throughout a given region, then it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with the national energy needs, and yet not so as to jeopardize clean air goals. For those regions which demonstrate a potential for clean fuel savings, an important related issue must be examined: the restrictiveness of fuel combustion emission regulations. Are the regulations more restrictive than necessary to allow the permittable emissions increases as determined by this review? That is, are the regulations overly restrictive for the attainment of secondary ambient air standards?

The initial part of this review was organized to provide a determination of the emissions tolerance which the various AQCRs are expected to possess by the time the implementation plan is complete in 1975. This tolerance was developed by consideration of the emissions/air quality data and an evaluation of the implementation plan itself. The background information for the tolerance assessment is contained in Section 2 and Appendix A. The emissions tolerance is a measure of the degree of "over-cleaning" accomplished by the plan, or in cases where the region already conforms to air quality standards, the tolerance is an expression of the degree of degradation possible before federal air quality standards are jeopardized. The tolerance assessment is combined in Appendix B with other regional air quality "indicators" to provide an overall evaluation of a region's candidacy for clean fuel savings (Section 3.1).

A detailed characterization of fuel combustion sources was carried out in Appendix C, D, and E (and discussed in Section 3.1). This basic data from these compilations was used in Appendix F to assess the restrictiveness of emission regulations with respect to attainment of air quality standards.

This was established by an assessment of the impact of combustion operations on air quality when these operations emit at a level equivalent to the ceiling rate of the emission regulation. The procedure for this evaluation is outlined in Section 3.3. Finally, the basic source data compliled in Appendix C, D, and E was also utilized to forecast the impact of a possible fuel switch to accomplish clean fuel savings in the State of Washington (Section 3.4).

3.1 ASSESSMENT OF CLEAN FUEL SAVINGS POTENTIAL BY REGIONAL AIR QUALITY INDICATORS

The feasibility for accomplishing clean fuel savings was evaluated by consideration of various regional air quality indicators developed in Section 2 and compiled in Appendix B (and then again by evaluation of the impact of a reasonable fuel switch as determined in Appendix F). The regional air quality indicators considered are comprised of criteria shown in Table B-1 and B-2, and include: 1) the breadth of air quality violations, 2) expected attainment dates, 3) proposed AQMA designations, 4) total regional emissions, 5) portion of emissions from fuel combustion, 6) and regional tolerance for emission increase. The emission tolerance possibly provides the most important indicator, since, if it is known, it provides a measure of the over-cleanliness of the region, now or projected, and indicates how much additional pollution (from dirtier fuels) can be permitted. The identification of AQMAs is also important, since this provides an indication of those areas where the emission tolerance is expected to diminish until non-existent in future years.

The assessment of the restrictiveness of fuel combustion regulations was performed with an evaluation of the impact of fuel burning operations on air quality when those operations emit at a level equivalent to the ceiling limit of the emission regulations. These emissions are calculated in Appendices C, D, and E for power plants, industrial/commercial point sources, and area sources, and then summarized in Appendix F.

Table B-1 indicates that two of the five regions (the Central and Northwest AQCRs) can be considered a good candidate for clean fuel savings (or possibly regulations relaxation) without jeopardizing compliance with,

or maintenance of, particulate ambient air quality standards. These regions have been assessed as good candidates to obtain clean fuel savings primarily because of their tolerance to accept substantial particulate emissions increases in 1975 (see Table A-10) and in following years. The Eastern, Southwest, and Portland Interstate AQCRs are judged to be marginal candidates for clean fuel savings based on a combination of two principal factors: 1) the uncertain adequacy of the present control strategy to attain or maintain standards in the areas of poorest air quality, and 2) the possibility that certain counties remote from the area of worst air quality may possess a tolerance for increasing particulate emissions.

Table B-2 shows that each of the AQCRs except the Portland Interstate, can be assigned as good candidates to accomplish clean fuel savings when they are constrained by attainment of the SO_2 air standards only. This evaluation results from the fact that these AQCRs are presently demonstrating "over compliance" with the standards, and that substantial SO_2 emission tolerances exist (and will be maintained) in these regions. In the Portland Interstate (Oregon portion), levels of ambient SO_2 are expected to increase steadily in the Portland Metro Area until air quality standards are exceeded in 1977. Therefore, the SO_2 emission tolerance of this AQCR will also diminish steadily until it will no longer be feasible to increase SO_2 emissions in the Portland Metro AQMA. However, because there may be areas in the Portland Interstate removed from the Portland Metro AQMA where SO_2 emissions may be increased without jeopardizing maintenance of current compliance with SO_2 air quality standards, the region has been assessed as a marginal candidate for clean fuel savings in Table B-2.

3.2 ASSESSMENT OF CLEAN FUEL SAVINGS POTENTIAL BY SOURCE ANALYSIS OF POWER PLANTS/INDUSTRIAL-COMMERCIAL/AREA SOURCES

As over 99% of all power generation in Oregon is hydro-electrically produced, there are only a limited number of fuel burning power plants in the State of Oregon. Fuel use and emission data for the two major fuel burning power plants operating in Oregon in 1973 is shown in Table C-1. These plants are predominantly gas-fired, and the emissions of SO_2 and particulates arising from their operation is virtually insignificant in the overall emission inventories of the affected AQCRs.

Table D-1 provides a summary of the major industrial/commercial fuel combustion point sources in the various AQCRs. The number of these sources which have been identified in the NEDS emission inventory is reported in Table A-7. In Table D-1, wood burning plants in each county have been aggregated as a single source, since it was not expected that clean fuel savings objectives would be applicable to wood burners (due to economic penalties associated with transport of waste woods for disposal or combustion elsewhere). The emissions summary of Table D-1 shows that industrial sources of all AQCRs are in substantial compliance with the SO_2 emission regulations. This is achieved through a combination of the burning of natural gas and wood. With respect to compliance to particulate regulations, the point sources are found to be substantially deficient in all regions except the Northwest AQCR. Based on the assessment of emission tolerance in the various AQCRs, compliance of these sources with particulate regulations may not be necessary in some regions (or areas) for the attainment of ambient air standards. For example, since the Central AQCR would permit an additional 3600 tons/yr of particulate emissions, it is evident that the present wood burning operations, which generate nearly 100% of the 3400 tons/yr of fuel combustion particulate emissions, can be maintained at status quo without the need of additional air pollution controls to attain the standards. For those AQCRs listed as marginal candidates (Portland Interstate, Eastern and Southwest AQCRs) for regulation revisions, it may be possible to relax regulations in those areas which appear to be removed from the areas of poorest air quality. For example, it appears evident that it would have minor impact on the air quality in most of the Eastern AQCRs if all the sources listed in Table D-1, except for those in Umatilla and Union Counties, were allowed to continue present burning practices. This would require the availability of about 1.3 tons/yr of emission tolerance in the "clean" counties of this AQCR. Since these counties are already meeting the air quality standards, it is apparent they possess this tolerance. In the Northwest AQCR, particulate emission sources are in substantial over-compliance with emission regulations due to the use of large amounts of gas used in boilers at the Georgia Pacific Plant. Emissions of particulates for this region would be 17 times greater if residual oil were used at the plant.

In fact, if fuel oils were used instead of gas, the regulations would probably not be sufficient to provide for maintenance of air quality standards in this region.

The significance of the fuel combustion area source varies greatly from region to region (Tables A-8 and A-9), but generally accounts for a large portion of the SO_2 emission inventory. For example, fuel combustion area sources in the Eastern AQCR accounted for 58% of the SO_2 emissions inventory and over 40% of the SO_2 emissions in the Central and Portland Interstate (Oregon Portion) were generated by area fuel combustion sources. The relative significance of the area source in the generation of particulate emissions is far less pronounced, varying from 3.3% to 5.5% of the overall particulate inventory. Area sources are comprised largely of residential and industrial space heating units, and small industrial and commercial boilers, burning distillate and residual fuel oils. Most of these units are exempt from emission control, and are not constrained to consume "clean" fuels. Therefore, it does not appear that significant fuel savings can be accomplished from the area source sector of the fuel consuming sources.

3.3 ASSESSMENT OF RESTRICTIVENESS OF FUEL COMBUSTION EMISSION REGULATIONS

Table F-1 and F-2 combine the analysis of Appendix C, D, and E (power plants, industrial/commercial, and area sources) to provide an assessment of the restrictiveness of fuel burning emission regulations. The assessment is carried out by evaluating the difference between the projected fuel combustion emissions in 1975 and those emissions which are emitted at the level of emission regulations. This difference constitutes the additional emissions which would result if, after compliance with regulations in 1975, all fuel burning sources were to alter fuels or operations, causing emissions to rise up to the level of the regulations. It is clear that if the additional emissions calculated are more than the emission tolerance compiled for the region (Tables A-10 and A-11), the emission regulations are not overly restrictive, and they should not be relaxed.

The concepts associated with the assessment of restrictivess of fuel combustion regulations are illustrated in Figure 3-1. It can be seen that there are two distinct levels of emissions which are "allowable." One of

these allowable levels corresponds to the total region-wide emissions which are generated when all regulated fuel combustion sources emit at the celing level of the emission regulations, and the other allowable level corresponds to the maximum region-wide emissions which can be permitted before air quality standards would be violated. In Figure 3-1, the emissions allowable when fuel burning equipment emits at the level of the fuel combustion regulations (Curve C) are shown to be less than that emission total which would jeopardize compliance with the federal air standards (Curve A). This would constitute a case in which fuel combustion emission regulations may be relaxed. Depending on the circumstances of an AQCR, it may be possible for curve C to be above or below the curves A and B in Figure 3-1. When curve C is above A after 1975, fuel combustion emission regulations are possibly less stringent than necessary to insure compliance with the standards.

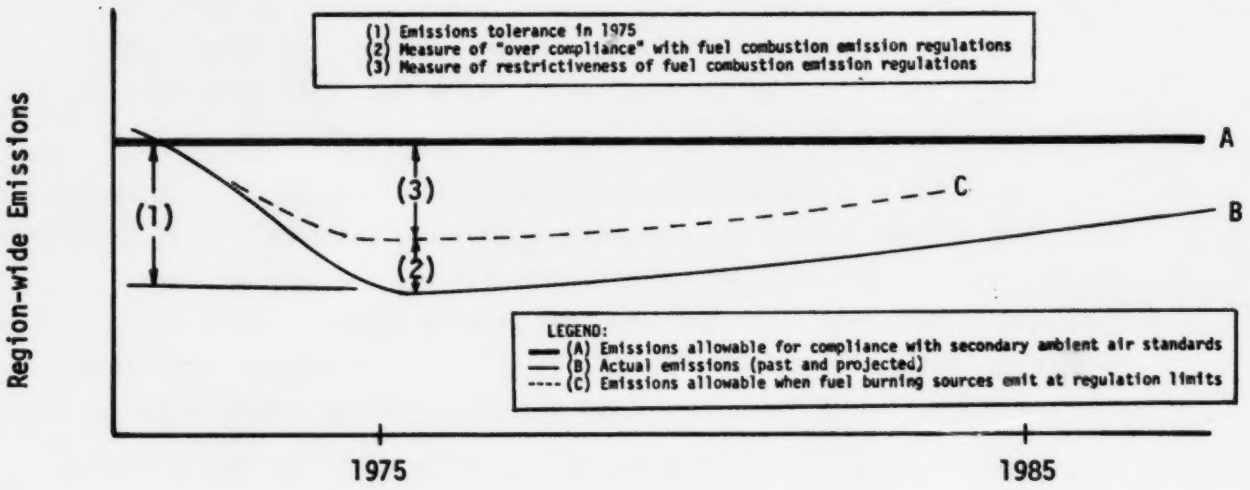


Figure 3-1. Evaluation of Restrictiveness of Fuel Combustion Emission Regulations

In Table F-1, it can be seen that for the year 1975, particulate fuel combustion emission regulations appear to be overly restrictive in the Central, Southwest, and Portland Interstate (Oregon portion) AQCRs. The analysis indicates that in these regions it would be possible for fuel combustion equipment to emit at the ceiling rate of the particulate emission regulations without jeopardizing attainment of the air quality standards for ambient particulate concentrations. However, as mentioned previously, air quality in the AQMAs of both the Southwest and Portland Interstate regions is projected to worsen steadily after 1975, therefore current fuel combustion regulations cannot be judged overly-stringent for maintenance of air quality standards in the vicinity of the AQMAs. In certain counties or portions of the Portland Interstate, Southwest, and Eastern AQCRs, where air quality is projected to remain in compliance with federal standards, it is possible that particulate fuel combustion emission regulations could be relaxed without threatening violation of standards.

In the Northwest AQCR, the analysis shows it is possible that emissions of particulates could, despite the constraints of the emissions regulations, increase beyond the allowable tolerance of the region, thus jeopardizing the air quality standards without violating the present emission regulations. Hence, fuel combustion emission regulations for particulates should not be relaxed in the Northwest AQCR.

Figures 3-2 provides an approximate portrayal of the findings extracted from Table F-1 and information presented in previous sections. These profiles are presented as an aid in depicting the general relationship between: 1) allowable emissions permitted when fuel burning equipment emits at regulation limits, 2) maximum allowable emissions permitted for compliance with the NAAQS, and 3) the actual (past and projected) emissions level.

It should be recognized that the curves of Figure 3-2 reflect a region-wide assessment based on the relationship between total regional particulate emissions and the worst air quality measured within the region. Hence, the portrayal of restrictiveness of regulations may not be representative of areas significantly cleaner than the area of worst air quality. Information

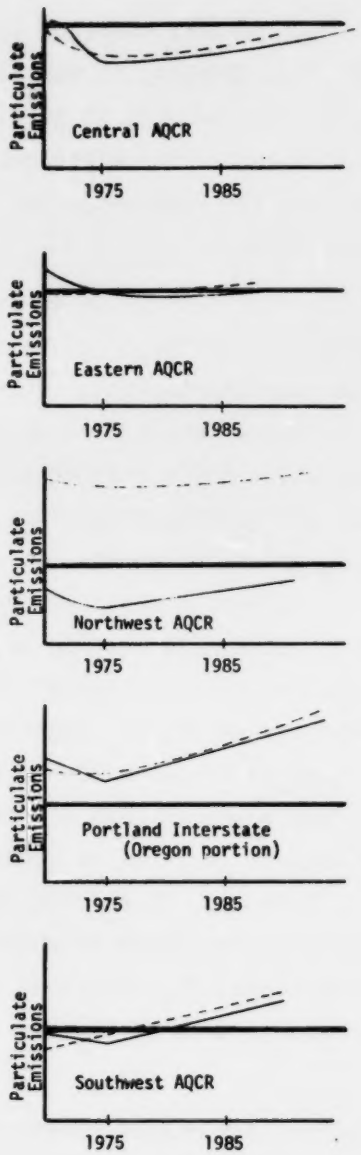

Particulate Emissions
Central AQCR
1975
1985
Regulations are more restrictive than necessary for maintenance of secondary ambient air standards.
Regulations may be relaxed.
Particulate Emissions
Eastern AQCR
1975
1985
Regulations are not too restrictive for attainment of secondary ambient air standards.
Regulations should not be relaxed, except possibly in cleaner areas of region.
Particulate Emissions
Northwest AQCR
1975
1985
Regulations are not too restrictive for maintenance of secondary ambient air standards.
Regulations should not be relaxed.
Particulate Emissions
Portland Interstate (Oregon portion)
1975
1985
Regulations are not too restrictive for attainment of secondary ambient air standards.
Regulations should not be relaxed, except possibly in cleaner areas of region which are removed from AQMAs.
Particulate Emissions
Southwest AQCR
1975
1985
Regulations are not too restrictive for maintenance of secondary ambient air standards.
Regulations should not be relaxed, except possibly in cleaner areas of region which are removed from AQMA.
LEGEND:
Emissions allowable for compliance with secondary ambient air standards
Actual emissions (past and projected)
Emissions allowable when fuel burning sources emit at regulation limits

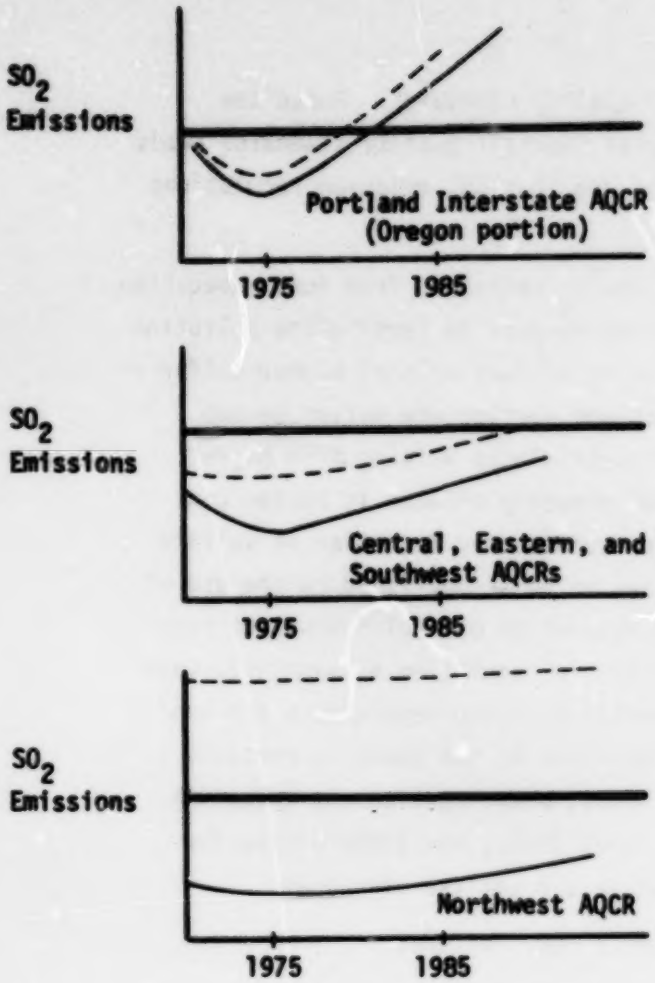
Figure 3-2. Restrictiveness of Fuel Combustion Particulate Emission Regulations in Oregon AQCRs. (Note: The profiles above are intended as conceptual portrayals only, and should not be scaled.)

available in this study did not permit a detailed assessment of air quality in various geographic areas within each AQCR, nevertheless, it was clear that significant portions of some of the regions would be able to permit more lenient particulate emission regulations than those determined necessary by the regionwide analysis. These regions are the Southwest, the Portland Interstate (Oregon portion) and the Eastern AQCRs.

Table F-2 provides an assessment of SO_2 fuel combustion emission regulations, and Figure 3-3 provides a graphical portrayal of this assessment. It is demonstrated that it would be possible to incur substantial relaxation of SO_2 fuel combustion emission regulations in all the regions except the Northwest and the Portland Interstate AQCRs without interfering with attainment or maintenance of ambient air quality objectives. Since the analysis of Table F-2 projects 1975 SO_2 emissions on the basis of continued use of present fuel schedules, it is estimated that the current high degree of over-compliance will prevail with respect to meeting SO_2 emissions regulations in 1975. Table F-2 shows a substantial increase of emissions would be caused if combustion equipment emitted at the SO_2 regulation limits. In all the regions, there is substantial room to increase SO_2 emissions without violating emission regulations. This suggests that significant clean fuel savings (in low sulfur fuel oil and natural gas) can be accomplished without the need of revising regulations. Moreover, in all the regions except the Northwest and Portland Interstate AQCRs, there is room after relaxing emission regulations to permit additional SO_2 emissions before emission tolerances would be used up, and maintenance of SO_2 air quality jeopardized.

In the Portland Interstate, there may be significant geographic areas removed from the Portland AQMA in which SO_2 fuel combustion emission regulations may be overly-stringent for maintenance of the SO_2 standards.

In the Northwest AQCR large quantities of natural gas are used to meet the fuel demands of the region. If combustion units were to emit at ceiling rates allowed by emission regulations for the probable fuel substitute, residual oil, total SO_2 emissions of the region would increase many times and the overall SO_2 emissions inventory would exceed that which is allowed



Regulations are not too restrictive for maintenance of secondary ambient air standards.

Regulations should not be relaxed, except possibly in cleaner areas of region which are removed from AQMA.

Regulations are more restrictive than necessary for maintenance of secondary ambient air standards.

Regulations may be relaxed.

Regulations are not too restrictive for maintenance of secondary ambient air standards.

Regulations should not be relaxed.

LEGEND:
- ▬▬ Emissions allowable for compliance with secondary ambient air standards
- —— Actual emissions (past and projected)
- ----- Emissions allowable when fuel burning sources emit at regulation limits

Figure 3-3. Restrictiveness of SO_2 Fuel Combustion Emission Regulations in Oregon AQCRs. (Note: The profiles above are intended as conceptual portrayals only, and should not be scaled.)

for the region to maintain the SO_2 air quality standards. Hence the analysis for the Northwest AQCR indicates that air quality standards would be violated before emission regulations and that SO_2 emission regulations are certainly not overly restrictive.

It should be noted that increases in SO_2 emissions from fuel combustion sources have significant implication with respect to particulate pollution problem in the various AQCRs. The burning of fuel oils of higher sulfur content results in higher levels of ambient particulate matter by two mechanisms: 1) increased emissions of particulates arising from higher sulfur fuels (particulate emissions are directly related to sulfur content of fuels), and 2) SO_2 acting as precursors for formation of sulfate particulates. If clean fuel savings are to be accomplished by the use of higher sulfur fuels (made possible by relaxation of fuel combustion regulations or by fuel schedule revisions within regulation allowances), care should be taken to insure that particulate emission regulations are upheld in the process. This is especially important in the Eastern, Portland Interstate, Northwest, and Southwest AQCRs, where particulate emissions, although in compliance with emission regulations, are jeopardizing the attainment and maintenance of particulate air quality standards.

3.4 ASSESSMENT OF THE IMPACT OF PROBABLE FUEL SWITCHES

The impact of a feasible fuel switch to obtain clean fuel savings in the State of Oregon is summarized in Table F-3. It was assumed that all gas burning combustion equipment would be converted to burn relatively high sulfur (2% S) residual fuel oil, and that all use of residual fuel oil would be converted to this higher sulfur (2% S) content. The switch is assumed to occur in 1975, after compliance with emission regulations has been attained (by particulate emission controls and use of low sulfur fuels). For those units which are converted for the fuel switch, it is assumed that no additional emission control equipment is installed. Hence, for all units converted from gas only to fuel oil, there will undoubtedly be accompanying emission regulation violations. Also, since it was assumed that SO_2 emission compliance is attained in 1975 through use of low sulfur fuels, conversion of these fuels to higher sulfur (2% S) oil will also incur emission regulation violations.

While such a conversion scheme is obviously imaginary, it would theoretically constitute a reasonable fuel switch, resulting in only minimal economic dislocation. The switch would accomplish clean fuel savings for low sulfur oils and natural gas. Table F-3 shows that, with regard to particulate emissions, the overall region-wide impact of the fuel switch is far less than the impact which would be caused by all fuel burning sources in the region emitting at the ceiling rate of the emission regulation (Table F-1). In other words, while the suggested fuel switch of Table F-3 would result in violations of the particulate emission regulations for the emission sources switched, the potential overall impact of this switch on air quality is diminished by the degree of over-compliance of other combustion sources (wood, oil) non-affected by the switch. Only a relatively small portion of the total heat input generated in the region is produced by the burning of gas, and hence only a small portion of the fuel conversion would occur on fuel burning equipment not already equipped with adequate emission controls. On the basis of the preliminary findings of Table F-3, it would appear that the reasonable fuel switch outlined here could be accomplished without seriously jeopardizing the attainment of secondary standards for particulates in the Central AQCR, and in portions of the Southwest, Portland Interstate (Oregon portion), and Eastern AQCRs removed from the area of worst air quality. Table F-3 shows that for the case of the Northwest AQCR, the clean fuel savings scheme would result in a region-wide particulate emissions increase of 7,922 tons/yr, exceeding the estimated emission tolerance of 7100 tons/yr for this region. Also, the switch would aggravate attainment and maintenance problems for particulate standards in the AQMAs of the Portland Interstate and Southwest AQCRs, and in the area of worst air quality in the Eastern AQCR.

The impact of the fuel switch (Table F-3) on SO_2 emissions in the various AQCRs is substantial. Violations of the emission regulations for SO_2 will occur for all fuel combustion sources presently burning residual oil or gas. These violations occur because of the conversion to a fuel oil with sulfur content of 2%, higher than the lower sulfur fuels now available to the State of Oregon, and slightly higher than the fuel oil sulfur content needed to meet the emission regulation in the various regions. The net

increase of SO_2 emissions caused by the fuel switch is less than the SO_2 emission tolerance in each of the regions except the Northwest AQCR, and the Portland Interstate. Hence, the fuel switch can be accomplished without jeopardizing air quality attainment goals in all of the regions except the Northwest AQCR, and the Portland Interstate. In the Portland Interstate region, it may be possible, however, to carry out the fuel switch in areas removed from the Portland Metro AQMA without affecting maintenance of NAAQS. In the Northwest AQCR, fuel consumption is predominantly natural gas, and conversion to residual oils would cause an increase in SO_2 emissions over the 1975 compliance level of about 120,000 tons/yr (this is far in excess of the allowable SO_2 emission tolerance of 14,500 tons/yr).

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APPENDIX A
STATE IMPLEMENTATION PLAN BACKGROUND

Tables of this appendix provide a summary of original and modified state implementation plan information, including original priority classifications, attainment dates, ambient air quality standards, and fuel combustion emission regulations. 1973 SAROAD data for SO_2 and particulate monitoring stations are summarized for the various AQCRs in the state. NEDS emissions data are tabulated for the various fuel burning categories in each of the AQCRs.

Tables A-10 and A-11 show a comparison of emission inventories in the original SIP and those from the NEDS. The tolerance a region possesses for measuring emissions without violation of national secondary ambient air quality standards is calculated for SO_2 and particulates. The intent of this calculation is to indicate candidate regions for clean fuel savings. The tolerance estimate was based on either the degree of control expected by the SIP or upon air quality/emission relationships which are calculated from the more recent NEDS and SAROAD data (see Section 2.2.4). The value of the emission tolerance provides an indication of the degree of potential an AQCR possesses for clean fuel savings and regulation relaxation.

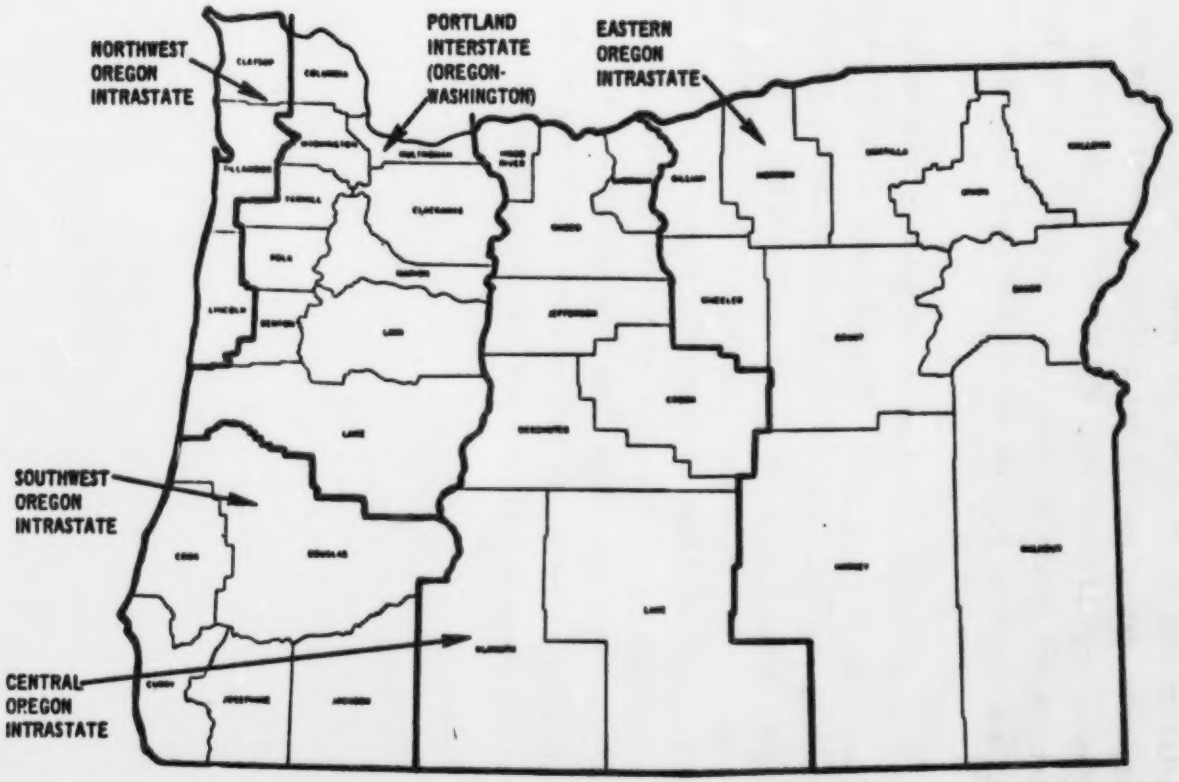

Figure A-1. Air Quality Control Regions In Oregon

Table A-1. Oregon Air Pollution Control Areas

Air Quality Control Region	Priority Classification[a]			Proposed AQMA Designations[b]	
	Particulate	SO_x	NO_x	TSP Counties	SO_2 Counties
Central (#190)	II	III	III	-	-
Eastern (#191)	II	III	III	-	-
Northwest (#192)	III	III	III	-	-
Portland Interstate (#193), Oregon Portion	I	IA	III	Clackmas, Multnomah, Washington, Lane	Clackmas, Multnomah, Washington,
Southwest (#194)	II	III	III	Jackson	-

[a] Criteria based on Maximum measured (or estimated pollution concentration in area) as shown below:

	I	II	III
Priority	Greater than	From-To	Less than
Sulfur oxide:			
Annual arithmatic mean..	100	60-100	60
24-hour maximum.....	445	260-455	260
Particulate matter:			
Annual geometric mean...	95	60- 95	60
24-hour maximum.....	325	150-325	150
Nitrogen dioxide	110		110

[b] Federal Register, August 1974 SMSA's showing potential for NAAQS violations due to growth

Table A-2. Regional Summary Information

Air Quality Control Region	Number of Counties	Area (Square Miles)	1970 Population	Population Density (Per square mile)
Central (#190)	8	25,734	140,798	5.5
Eastern (#191)	10	41,035	131,502	3.2
Northwest (#192)	3	2,906	72,262	24.9
Portland Interstate (#193), Oregon Portion Only	10	13,778	1,449,607	105
Southwest (#194)	5	12,731	271,5431	21.3

Source: Newspaper Enterprise Association, World Alamanac, 1973.

Table A-3. Air Quality Attainment Dates

AQCR Name	Particulates		Sulfur Dioxide	Nitrogen Oxides
	Attainment Dates		Attainment Dates	Attainment Dates
	Primary	Secondary	Primary	
Central (#190)	a	5/75	a	a
Eastern (#191)	5/75	5/75	a	a
Northwest (#192)	a	a	a	a
Portland Interstate (#193) Oregon Portion Only	5/75	5/75	a	a
Southwest (#194)	5/75	5/75	a	a

[a]Air quality levels are currently meeting the federal air standards.

Table A-4. Federal and State Ambient Air Quality Standards

		All Concentrations in $\mu gms/m^3$				
		Total Suspended Particulate		Sulfur Dioxide		
		Annual	24-Hour	Annual	24-Hour	3-Hour
Federal	Primary	75 [G]	260[a]	80 [A]	365[a]	-
	Secondary	60 [G]	150[a]	-	-	1300[a]
State	Standard	60 [G]	150[a]	60	260	1300[a]

a Not to be exceeded more than once per year

[A] Arithmetic mean

[G] Geometric mean

Table A-5. Summary of 1973 Air Quality Status for Suspended Particulates[a]

AQCR Name	# Of Stations Reporting	TSP Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24 hr	Highest 2nd Highest Reading 24 hr	Number of Stations Exceeding Ambient Air Quality Standards Primary Annual	Primary 24 hr[b]	Secondary Annual	Secondary 24 hr[b]	Emission Reductions Required to Meet Secondary Standards[c] Annual	24-hr
Central	5	-	295	205	0	0	0	1	-	30%
Eastern	4	-	243	202	0	0	0	2	-	29%
Northwest	1	-	100	96	0	0	0	0	-	d
Portland Interstate	68	66	265	205	0	0	2	9	11.5%	29%
Southwest	6	6	154	145	0	0	0	0	d	d

1. Blank (-) indicates value is indeterminate due to absence of air quality data.

[a]Compiled from 1973 air quality data in National Air Data System as of June 7, 1974.

[b]Violations are based on readings which exceed the value of the NAAQS after the first time.

[c]Reduction required = $\frac{A-C}{A-B} \times 100$. Where A = 2nd highest measured air quality for period of standard
B = the background concentration
C = the concentration value of the standard.

[d]Air quality presently in attainment with standards.

Table A-6. Summary of 1973 Air Quality Status for SO_2[a]

AQCR Name	# Stations Reporting 24-Hr. (Bubbler)	# Stations Reporting (Contin.)	SO_2 Concentration $\mu g/m^3$			# Stations Exceeding Ambient Air Quality Stds.			Emission Reduction Required To Meet 24-Hour Standard[c]
			Highest Reading			Primary		Secondary	
			Annual	24-Hr.	2nd Highest 24-Hr	Annual	24-Hr[b]	3-Hr[b]	
Central	1	0	-	73	13	-	0	-	d
Eastern	1	0	-	13	13	-	0	-	d
Northwest	1	0	-	13	13	-	0	-	d
Portland Interstate	5	5	-	235	234[e]	-	0	-	d
Southwest	1	0	-	13	13	-	0	-	d

1. Blanks (-) indicate value is indeterminate due to absence of air quality data.

[a]Compiled from 1973 air quality data in National Air Data System as of June 7, 1974.

[b]Violations are based on readings which exceed the value of the NAAQS after the first time.

[c]% reduction required = $\frac{A-C}{A} \times 100$. Where A = 2nd highest measured air quality for period of standard.
C = the concentration value of the standard.

[d]Air quality presently in attainment with standards (no emission reductions are necessary).

[e]It should be recognized that those stations utilizing continuous SO_2 monitors do not report the second highest 24 hour value to the SAROAD system. The 234 ug/m^3 figure reported here was obtained by separate input from the Oregon Department of Environmental Quality for a SAROAD station employing a continuous SO_2 monitor.

Table A-7. Fuel Combustion Source Summary

AQCR Name	Number of Power Plants[a]	Number of Industrial or Commercial Point Sources[a] for	
		Particulates	SO_2
Central (#190)	0	22	2
Eastern (#181)	0	15	0
Northwest (#192)	0	7	5
Portland Interstate (#193) Oregon portion only	3	66	17
Southwest (#194)	0	38	5

[a]This represents the total number of combustion point sources inventoried in the NEDS 1973 Rank-Order Source Summary. Only emission sources of 1 ton/year or greater are reported.

Table A-8. Fuel Combustion Emissions Summary for 1973, Particulates[a]

AQCR	Total (10^3 Tons/Year)	Total from Fuel Combustion (10^3 Tons/Year)	Percent Fuel Combustion	Electricity Generation		Industrial-Commercial Fuel Combustion		Area Source Fuel Combustion	
				(10^3 Tons/Year)	%	(10^3 Tons/Year)	%	(10^3 Tons/Year)	%
Central (#190)	16.6	4.0	23.8	0	0	3.4	20.5	.6	3.3
Eastern (#191)	13.7	3.1	22.3	0	0	2.3	16.8	.8	5.5
Northwest (#192)	8.0	1.3	16.2	0	0	1.0	12.3	.3	3.9
Portland Interstate (#193), Oregon portion only	93.5	15.0	14.0	.3	.3	9.4	10.0	4.3	4.6
Southwest (#194)	55.0	12.0	21.9	1.3	2.4	8.8	16.0	1.9	3.5

[a]Emission figures were extracted from NEDS, "1972 National Emissions Report."

Table A-9. Fuel Combustion Emissions Summary for 1973, SO_2[a]

AQCR	Total (10^3 Tons/Year)	Total from Fuel Combustion (10^3 Tons/Yr)	Percent Fuel Combustion	Electricity Generation		Industrial-Commercial Fuel Combustion		Area Source Fuel Combustion	
				(10^3 Tons/Year)	%	(10^3 Tons/Year)	%	(10^3 Tons/Year)	%
Central (#190)	3.4	1.5	44.7	0	0	.12	3.5	1.4	41.2
Eastern (#191)	2.6	1.5	57.7	0	0	0	0	1.5	57.7
Northwest (#192)	2.8	2.0	72.5	0	0	1.4	50.0	.63	22.5
Portland Interstate #193), Oregon Portion only	24.2	12.9	53.3	.25	1.0	2.4	9.9	10.2	42.2
Southwest (#194)	7.7	4.1	53.7	.03	.4	2.0	26.0	2.1	27.3

[a] SO_2 emission figures were extracted from NEDS, "1972 National Emissions Report."

Table A-10. Assessment of Emission Tolerance, Particulates

Baseyear and Forecasted Information from State Implementation Plan							Air Quality and Emissions Data from SAROAD and NEDS[d]				
AQCR	Level of Air Quality Selected as Control Value for SIP (ug/m^3)	Emission Reduction Required for Attainment Based on Selected Value	Region-wide Baseyear (1970) Emissions of Total Particulates[a] (10^3 tons/yr)	Allowable Region-wide Emissions (Total Particulates) for Attainment[a] (10^3 tons/yr)	Region-wide Emission(Total Particulates) Forecasted Under SIP in 1975 (10^3 tons/yr)	Comments on Control Strategy and Area of Greatest Impact	Level of Worst Air Quality in 1973[c] (ug/m^3)	Emission Reduction Required for Attainment	Region-wide Emissions (Total Particulates in 1972) (10^3 tons/yr)	Region-wide Allowable Emissions (Total Particulates) (10^3 tons/yr)	Summary of Emission Tolerance of AQCR for Total Particulates in 1975.[b]
Central (#190)	60 (Annual)	23%	15.7	12.1	12.1	Application of control strategy of example region (southwest) expected to achieve necessary emissions reduction to attain standards.	205 (24-hr)	29.7%	16.6	11.7	R. 3.6 x 10^3 tons/yr tolerance on region-wide basis.
Eastern (#191)	76 (Annual)	36%	10.8	7.0	7.0	Reduction of 24% of fine particulate emissions projected for area of worst air quality (Umatilla County). Adequacy of strategy to be determined when background concentrations are assessed.	202 (24-hr)	28.6%	13.7	9.8	NR. None indicated in vicinity of poorest air quality, however, significant tolerance may exist in other counties.
Northwest (#192) (#192)	36 (Annual)	0%	6.5	13.6	6.5	Emissions of particulates to decrease under regulatory provisions of example region (Southwest) which are to be applied to this region.	96 (24-hr)	0 %	8.0	13.3	R. 7.1 x 10^3 tons/yr tolerance on region-wide basis.
Portland Interstate (#193) Oregon portion	76 (Annual)	25%	87.7	65.7	36.0	Overall emission reductions of 44% of fine particulates to be achieved region-wide, including area of worst air quality (Portland). Reduction achieved principally by control of wood products industry.	205 (24-hr)	28.8%	93.5	66.6	R. No tolerance is indicated, based on special assessment (see Note 3 below). However, significant tolerance may exist and persist in areas removed from AQMA.
Southwest (#194)	78 (Annual)	28%	64.8	39.4	21.1	Overall emission reduction of 54% of fine particulates to be achieved region-wide. A 30% reduction is expected in county of worst air quality, Jackson.	145 (24-hr)	0 %	55.0	57.1	NR. 2.1 x 10^3 tons/yr tolerance on region-wide basis and diminishing to zero in near-term. However, significant tolerance may exist and persist in areas removed from AQMA.

[a]Allowable emissions for attainment of secondary standards are computed with the assumption that the overall emissions within the entire AQCR contribute proportionally to the air quality at the state reporting the most severe air quality violations. The allowable level is then calculated using the rollback from the most severe violation which is needed to obtain federal standards.

[b]The basis for assessing a region's tolerance for emission increase is determined by a judgment of the degree of reconciliation between the SIP information and the 1973 NEDS/SAROAD data. If the allowable emissions determined under the SIP development is in accord (within 20%) with the allowable emissions calculated from 1973 air quality and emission data, the forecasts of the SIP are considered valid, and emission tolerance can be computed by taking the difference between allowable emissions and those emissions forecast for 1975. However, in the case where reconciliation of the two data sources is difficult, it is assumed that the SIP may be based on untenable grounds, and that the more current NEDS/SAROAD data is a more valid indicator of the air quality/emissions relationship. In this case the emission tolerance expected in 1975 can only be roughly estimated based on the 1973 air quality-emission status. Hence, in a sense, the emissions tolerance is tabulated for either the year 1975 (based on forecast of implementation Plan) or for 1973 (based on 1973 air quality/emissions data). Note: NR indicates "not reconcilable," and R indicates "reconcilable."

[c]Refers to the highest 2nd high 24 hour average value in region, or to highest annual value measured in the region (whichever constitutes the worst air quality relative to the air standard). See Table A-4 for definition of federal air quality standards.

[d]Air quality data is for the year of 1973 from SAROAD. Emissions data was available from NEDS for the year 1972.

[e]Because the forecasted emission levels are substantially less than those necessary to achieve the level of allowable region-wide emissions, it appears that the control strategy is designed for "over-attainment" of air standards. This degree of apparent over-design is due to the formulation of the control strategy based on control of fine particulates (thought to be more representative of measured levels of suspended particulates), rather than total particulates, as expressed above.

Notes:

1. The control strategy of SIP was based on limited air quality data from a monitoring network which has since been expanded to include more sites. Hence if the air quality to emissions relationship from the 1970 baseyear is irreconcilable with the 1973 SAROAD information, this may be a reason.

2. The control values selected for the SIP development were based solely on annual values of particulate concentrations despite the fact 24-hour values were observed to constitute more severe violators of the federal air standards. Hence this may be one reason why the air quality/emissions relationship from the 1970 baseyear is irreconcilable with the 1973 SAROAD information.

3. Recent analysis by the State indicates secondary particulate standards may not be achieved in the Portland Metro Area by 1975, and that air quality will steadily worsen after 1975. This recent analysis updates the information presented above, and has provided the basis for the Portland Interstate emission tolerance evaluation above.

Table A-11 Assessment of Emission Tolerance for SO_2

Baseyear and Forecasted Information from State Implementation Plan							Air Quality and Emissions Data From SAROAD and NEDS[a]				
AQCR	Level Of Air Quality Selected As Control Value For SIP[3] ($\mu g/m^3$)	Emission Reduction Required For Attainment Based On Selected Values	Region-wide Baseyear Emissions (10^3tons/yr)	Allowable Region-wide Emissions For Attainment[a] (10^3tons/yr)	Region-wide Emissions Forecasted For AQCR Under SIP For 1975 (10^3tons/yr)	Comments on Control Strategy	Level of Worst Air Quality In 1973[c] ($\mu g/m^3$)	Emission Reduction Required For Attainment	Region-wide Emissions in 1972 (10^3tons/yr)	Region-wide Allowable Emissions (10^3tons/yr)	Summary of Emission Tolerance of AQCR for SO_2 in 1975.[b]
Central (#190)	13 (Annual)	0%	3.6	22.2	3.6	Strategy will minimize increases in SO_2 emissions in this region.	13 (24-hr)	0%	3.4	20.9	R. 16.6×10^3 tons/yr.
Eastern (#191)	33	0%	2.6	6.3	2.6	Same as above	13 (24-hr)	0%	2.6	16.0	NR. 13.4×10^3 tons/yr.
Northwest (#192)	37 (Annual)	0%	2.8	6.1	2.8	Same as above	13 (24-hr)	0%	2.8	17.3	NR. 14.5×10^3 tons/yr.
Portland Interstate (#193) Oregon Portion	190[c] (24-hr)	0%	25.5	49.0	24.0	Controls for sulfite pulp mill SO_2 emissions are projected to yield a 6% decrease in overall SO_2 emissions in Oregon portion of region.	234 (24-hr)	0%	24.2	76.6	NR. 37.8×10^3 tons/yr, diminishing to zero by 1977 (see Note 1). Significant tolerance may exist and persist in areas removed from AQMAs.
Southwest (#194)	6 (Annual)	0%	8.2	62.0	8.2	Strategy will minimize increases in SO_2 emissions in this region.	13 (24-hr)	0%	7.7	47.3	NR. 39.6×10^3 tons/yr.

[a] Allowable emissions for attainment of secondary standards are computed by assuming that region-wide emissions contribute proportionately to the air quality at the site reporting the worst air quality readings. The allowable level is calculated using the reduction (or increase) from the worst air quality reading which corresponds to attainment of the federal air quality standards.

[b] The basis for assessing a region's tolerance for emission increase is determined by a judgement of the degree of reconciliation between the SIP information and the 1973 NEDS/SAROAD data. If the allowable emissions determined under the SIP development is in accord (within 20%) with the allowable emissions calculated from 1973 air quality and emission data, the forecasts of the SIP are considered valid, and emission tolerances can be computed by taking the difference between allowable emissions and those emissions forecast for 1975. However in the case where reconciliation of the two data sources is difficult, it is assumed that the SIP may be based on untenable grounds, and that the more current NEDS/SAROAD data is a more valid indicator of the air quality/emissions relationship. In this case the emission tolerance expected in 1975 can only be roughly estimated based on the 1973 air quality-emissions status. Hence, in a sense, the emissions tolerance is tabulated for either the year 1975 (based on forecast of the Implementation Plan), or for 1973 (based on 1973 air quality/emissions data). Note: NR indicates "not reconcilable," and R indicates "reconcilable."

[c] SO_2 concentrations utilized in formulating the control strategies were the first highest readings, as opposed to the 2nd highest specified by the federal standards.

[d] Refers to highest 2nd high 24 hour average value in region, or to highest annual value measured in the region (whichever constitutes the worst air quality relative to the air standard). See Table A-4 for definition of federal air quality standard violations.

[e] Air quality data is for the year of 1973 from SAROAD. Emissions data was available from NEDS for the year 1972.

Notes:
1. Recent analysis by the State indicates secondary air quality standards for SO_2 may be exceeded by 1977 in the Portland Metro AQMA.

Table A-12. Fuel Combustion Emission Regulations in Oregon

Governing Authority	Applicable Region	SO_2 Emission Regulations	Compliance Date	TSP Emission Regulations	Compliance Date
Oregon Department of Environmental Quality	Central AQCR Eastern AQCR Northwest AQCR Southwest AQCR	For combustion units 150 x 10^6 Btu/hr 1.4 lb $SO_2/10^6$ Btu input of liquid fuel 1.6 lb $SO_2/10^6$ Btu input for solid fuel For combustion units 250 x 10^6 Btu/hr .8 lb $SO_2/10^6$ Btu input of liquid fuel 1.2 lb $SO_2/10^6$ Btu input of solid fuel Sulfur content in Fuels: 1.75% S - Residual fuel oils .3% S - Distillate fuel #1 .5% S - Distillate fuel #2 1.0% S - Coal	Immediate " " " July 1, 1972 " " "	.2 grains/SCF existing sources .1 grains/SCF new sources	Immediate
Mid-Willamette Air Pollution Authority	Counties of Yamhill, Polk, Benton, Marion, and Linn in the Portland Interstate AQCR	1000 ppm stack emission limit	Immediate	Same as Department of Environmental Quality regulation.	Immediate
Lane Regional Air Pollution Authority	County of Lane in the Portland Interstate AQCR	" " " "	"	" " "	"
Columbia-Willamette Air Pollution Authority[a]	Counties of Clackamas, Columbia, Multnomah and Washington in the Portland Interstate AQCR	" " " "	"	See Figure A-2.	"

[a]The CWAPCA has been eliminated since the formulation of the State Implementation Plan, however, the regulations established by this authority remain as part of the approved plan.

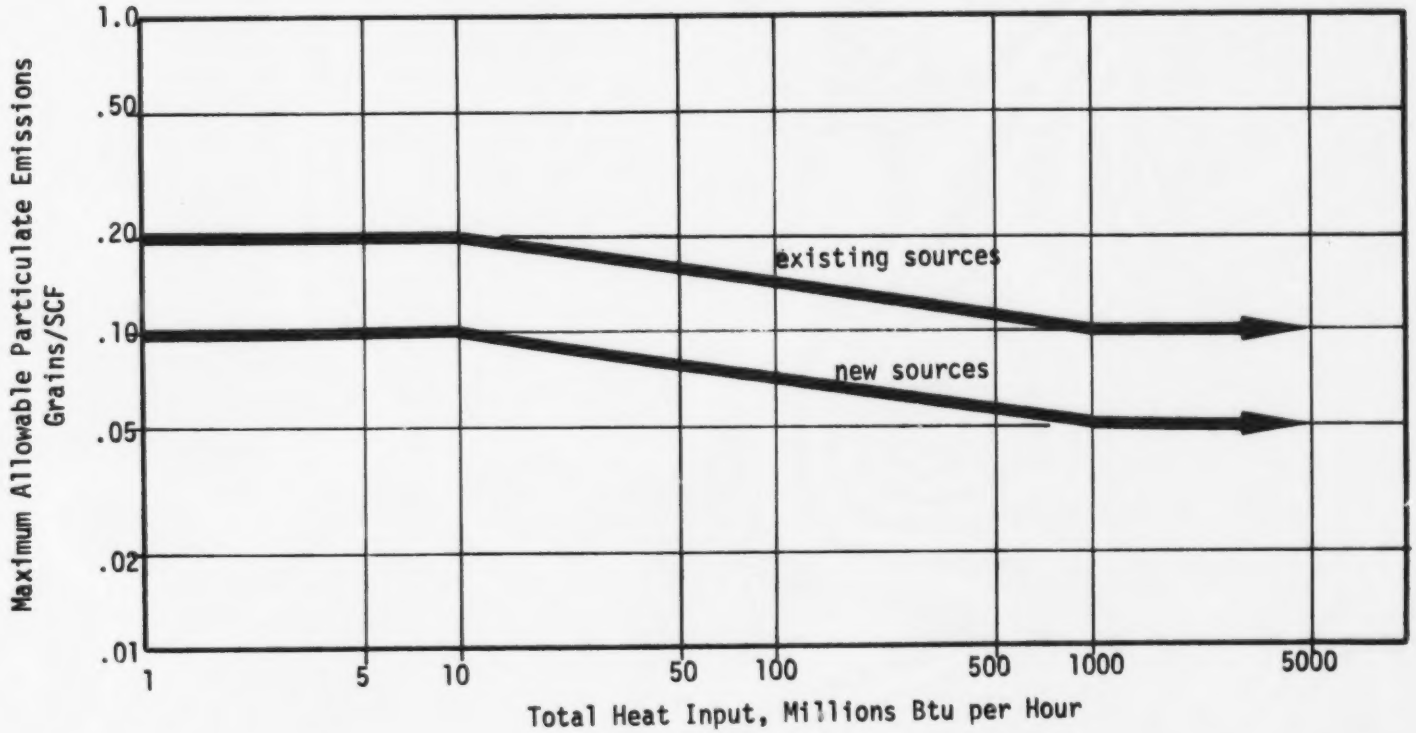

Figure A-2. Particulate Emission Regulation for Fuel Combustion Equipment in Counties of Clackamas, Columbia, Multnomah, and Washington (Portland Interstate AQCR)

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APPENDIX B
REGIONAL AIR QUALITY ASSESSMENT

The purpose of Appendix B is to provide an assessment of the feasibility for accomplishing clean fuel savings and regulation relaxation. This assessment is carried out with an evaluation of various regional air quality indicators developed in Section 2 and compiled in Appendix A. The regional air quality indicators considered are comprised of criteria shown in Table B-1 and B-2, and include: (1) the breadth of air quality violations, (2) expected attainment dates for NAAQS, (3) proposed AQMA designations, (4) total regional emissions, (5) portion of emissions from fuel combustion sources, and (6) regional tolerance for emissions increase. When it is quantifiable and suitably applied, the emission tolerance possibly provides the most important indicator, since it provides a measure of the over-cleanliness of the region, now or projected, and indicates how much additional pollution (such as from dirtier fuels) can be permitted without resulting in violations of federal air standards. The identification of AQMAs is also important as it indicates which areas are expected to lose their tolerances for increased emissions in the future.

Table B-1. Candidacy Assessment for Clean Fuel Savings/Relaxation of Particulate Regulation

AQCR	Fraction of Counties in AQCR with Air Quality Violations in 1973[b]	Expected Attainment Date	Counties with Proposed AQMA Designations	Total Particulate Emissions in AQCR (1973) 10^3 tons/yr.	% Emission from Fuel Combustion	Tolerance for Particulate Emissions Increase (Table A-10) (10^3 tons/yr)	Overall Regional Evaluation
Central (#190)	1/7	a	None	16.6	23.8	3.6	Good Candidate
Eastern (#191)	1/10	5/75	None	13.7	22.3	None[a]	Marginal Candidate[d]
Northwest (#192)	0/3	a	None	8.0	16.2	7.1	Good Candidate
Portland Interstate (#193) Oregon portion	2/11	5/75	Clackmas, Multonomah, Washington, Lane	93.5	14.0	30.7[c]	Marginal Candidate[d]
Southwest (#194)	0/5	5/75	Jackson	55.0	21.9	2.1[c]	Marginal Candidate[d]

[a]While no emission tolerance was indicated by the regionwide analysis shown in Table A-11, significant tolerance may exist in counties away from the areas of worst air quality.

[b]It should be noted that air monitoring stations do not exist in several of the counties.

[c]This emission tolerance is expected to diminish after 1975 (due to growth and other factors) until non-existent.

[d]The region has been rated "marginal" rather than "poor" because some portions (or counties) of the region may be able to tolerate additional emissions of particulate matter without jeopardizing attainment or maintenance of air quality standards.

Table B-2. Candidacy Assessment for Clean Fuel Savings/Relaxation of SO_2 Regulations

AQCR	Fraction of Counties in AQCR with Air Quality Violations in 1973	Expected Attainment Date	Counties with Proposed AQMA Designations	Total SO_2 Emissions in AQCR (1973) 10^3 tons/yr	% Emission from Fuel Combustion	Tolerance for SO_2 Emissions Increase (Table A-10) (10^3 tons/yr)	Overall Regional Evaluation
Central (#190)	0/7	a	None	3.4	1.5	18.6	Good Candidate
Eastern (#191)	0/10	a	None	2.6	1.5	13.4	Good Candidate
Northwest (#192)	0/3	a	None	2.8	2.0	14.5	Good Candidate
Portland Interstate (#193) Oregon Portion	0/11	a	Clackmas, Multnomah, Washington	24.2	12.9	52.6[c]	Marginal Candidate[d]
Southwest (#194)	0/5	a	None	7.7	4.1	39.6	Good Candidate

[a]Air quality levels within standards in 1973 and expected to remain so through 1975.

[b]It should be noted that air monitoring stations do not exist in several of the counties.

[c]This emission tolerance is projected to diminish steadily after 1975 until non-existent in 1977.

[d]The region has been rated "marginal" rather than "poor" because some portions (or counties) may be able to tolerate additional SO_2 emissions without jeopardizing attainment or maintenance of SO_2 air quality standards.

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APPENDIX C
POWER PLANT ASSESSMENT

This section provides a characterization of individual power plants by AQCR. Current power plant information used to prepare Table C-1 were obtained from three main sources: (1) Federal Power Commission computerized listings of power plants and their associated fuel use, (2) the National Coal Association "Steam Tables" listing of power plants and fuel use in 1972, and (3) emission data in the NEDS data bank as of 1974. 1973 fuel schedules were extracted from the FPC (1 above) data, or when this was not available, 1972 fuel schedules were reported in Table C-1 from values extracted from the Steam Tables. Heat inputs were calculated based on the fuel heating values obtained from either (1) or (3) above. The SO_2 and particulates emissions reported in Table C-1 correspond to the fuel schedules reported, and were extracted from (1) or (3) above. When emissions and fuel schedule figures were not available for the same year, emissions were scaled proportionately to reflect the 1973 fuel schedule.

Also shown in Table C-1 are the 1975 regulations which are currently applicable to the given plant, taken from Table A-12.

It might be cautioned that AQCR total emissions calculated in the tables of Appendix C (and also Appendix D) may not agree exactly with total emissions represented in Appendix A (Tables A-8, A-9). This is a result of both differing fuel schedules in 1973 compared to previous years and the relative "completeness" of the NEDS data bank.

Table C-1. Power Plant Characterization

County	Plant Name Size, and Fuel Design	Fuel Use: Type % Sulfur % Ash	Fuel Use: Annual Quantity[b]	Fuel Use: Heat Input (10^6 Btu/hr)	Emissions: SO_2 Existing tons/yr	Emissions: SO_2 Existing lbs/10^6 Btu	Emissions: SO_2 Allowable[a] tons/yr	Emissions: SO_2 Allowable[a] lbs/10^6 Btu	Emissions: Particulates Existing tons/yr	Emissions: Particulates Existing lbs/10^6 Btu	Emissions: Particulates Allowable[a] tons/yr	Emissions: Particulates Allowable[a] lbs/10^6 Btu
Portland Interstate AQCR (Oregon Portion): Multnomah	Pacific Power & Light 36 MW Oil, Gas	Oil 0.1%S	8400	744	66	0.10	637	1.94	96	0.15	139	.22
		Gas	1855	212	1	-	938	1.94	17	0.02	204	.22
	Portland General Electric Co. 76 MW Gas	Gas	564	64	1	-	283	1.94	4	0.01	70.1	.25

[a]Allowable emissions refers to the maximum emissions permitted by emission regulations. Fur fuel burning equipment operating on gas, the allowable emissions were considered to be those which would be permitted if the equipment used residual oil instead.

[b]Oil - 10^3 gallons, Gas - 10^3 MCF, Coal - 10^3 tons.

Note: Data was extracted from information in NEDS as of 1974, from Federal Power Commission tabulations of power plant fuel use, and from the National Coal Association "Steam Tables." Calculation and conversion of units of emission rates were facilitated by reference to "How to Convert Air Pollution Data with Seven Simple Curves," KVB Engineering, Electric Light and Power, July 1974.

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APPENDIX D

INDUSTRIAL, COMMERCIAL, INSTITUTIONAL SOURCE ASSESSMENT

This section provides a characterization of individual industrial/commercial/institutional fuel combustion emission sources. The data was derived from a NEDS rank order emissions listing, and from emissions data in the NEDS data bank as of June 1974.

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
CENTRAL AQCR (#190):												
Klamath	Wood Burning Plants	Wood	419200	574	210	.08	210	.08	2520	1.06	754	.3
Lake	Eastern Oregon Pine	R. Oil 1.0%S	1140	19.5	91	1.07	119	1.4	13	0.15	25.6	.3
	Fremont Sawmill	D. Oil 1.2%S	300	4.8	26	1.24	8.4	0.4	3	0.13	6.3	.3
	Wood Burning Plants	Wood	21000	29	10.5	.08	10.5	.08	126	0.99	38.1	.3
Wasco	Harvey Alum Co.	Gas	259	29.6	1	---	182	1.4	2	0.02	38.9	.3
	Wood Burning Plants	Wood	7000	9.6	3.5	.08	3.5	.08	12	0.29	12.6	.3
Crook	Consolidated Pine	R. Oil 1.5%S[c]	16000	274	1884	1.6	942	0.8	96	0.08	360	.3
	Wood Burning Plants	Wood	51000	70	26	.08	26	.08	171	0.56	92.0	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization.

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Deschutes	Wood Burning Plants	Wood	299000	410	150	.08	3000	1.6	310	0.17	539	.3
Hood River	U.S. Plywood Corporation	Gas	250	28.5	1	--	175	1.4	2	0.02	37.4	.3
		Wood	4000	5.5	2	.08	2	.08	7	0.29	7.2	.3
	Wood Burning Plants	Wood	25800	35	13	.08	13	.08	108	0.70	46.0	.3
Jefferson	Wood Burning Plants	Wood	9000	12.3	4.5	.08	4.5	.08	54	1.00	16.2	.3
	TOTAL			1501.8	2421		4697		3424		1974	
EASTERN AQCR (#191):												
Baker	Ellingson Lumber	R. Oil[c] 1.5%S	22000	377	2591	1.57	2310	1.4	132	0.79	49.9	.3
Grant	Wood Burning Plants	Wood	147000	201	74	.08	74	.08	912	1.04	264	.3
U Matilla	U.S. Gypsum	Gas	285	32.5	1	--	114	0.8	3	0.02	42.7	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
U.Matilla	Wood Burning Plants	Wood	53000	72.6	26.5	.08	26.5	.08	318	1.00	95.4	.3
Union	Boise Cascade	Gas	132	15.0	1	--	92.0	1.4	1	0.02	19.7	.3
		Wood	115400	158	57.7	.08	1154	1.6	692	1.0	2.1	.3
Wallowa	Wood Burning Plants	Wood	10000	13.7	5.0	.08	5	.08	60	1.0	18.0	.3
Wheeler	Wood Burning Plants	Wood	31000	42.5	15.5	.08	15.5	.08	186	1.0	55.8	.3
	TOTAL			912.3	2770		3791		2304		548	
NORTHWEST AQCR (#192):												
Clatsop	Wood Burning Plants	Wood	24000	32.9	12.0	.08	12	.08	21	0.15	43.2	.3
	Crown Zell	R. Oil 2.0%S	2910	49.8	463	2.12	306	1.4	15	0.07	65.4	.3
		Gas	2720	311	1	.01	1090	0.8	20	0.01	409	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Lincoln	Georgia Pacific	R. Oil 1.7%S	3860	66.1	500	1.7	412	1.4	19	0.07	86.9	.3
		Gas	112270	12817	34	.01	44910	0.8	674	0.01	16842	.3
	Wood Burning Plants	Wood	31300	42.9	15.7	.08	15.7	.08	179	0.95	56.4	.3
Tillamook	Publishers Paper	R. Oil 1.3%	2320	39.7	240	1.38	243	1.4	28	0.16	52.2	.3
	Ore.Wash. Mwd.	R. Oil 2.0%S	230	3.9	37	2.17	23.9	1.4	3	0.18	5.1	.3
	TOTAL			13363.3	1303		47013		959		17560	
PORTLAND INTERSTATE (#193), OREGON PORTION:												
Benton	Georgia Pacific	Gas	56	6.4	1	--	28.3	1.94	3	0.11	8.4	.3
	Evans Products	Gas	300	34	3	0.02	150	1.94	12	0.08	44.7	.3
Clackamas	Publishers Paper	Gas	1380	158	1	--	6-9	1.94	34	0.05	166	.24

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Clackamas (cont')	Publishers Paper	R. Oil[c] 1.5%S	510	8.7	60	1.57	38.6	1.94	8	0.21	11.4	.3
	Boise Cascade	R. Oil[c] 1.5%S	4074	69.8	485	1.59	308	1.94	46	0.15	82.5	.27
		Gas	2010	229	1	--	1013	1.94	18	0.02	221	.22
	Wood Burning Plants	Wood	25954	35.6	13	.08	13	.08	156	1.00	46.8	.3
Lane	Bohemia Lbr.Co.	R. Oil[c] 1.5%S	35000	599	4121	1.57	866	1.94	210	0.08	787	.3
	Giustina Bros.Pl	Gas	1500	171	1	--	757	1.94	14	0.02	225	.3
	Weyerhaeuser Co.	R. Oil 1.5%S	1360	23.3	162	1.59	103	1.94	16	0.16	30.6	.3
		Gas	1010	115	1	--	509	1.94	9	0.02	151	.3
	Wood Burning Plants	Wood	530340	727	265	.08	265	.08	4840	1.52	955	.3
Linn	Boise Cascade	Gas	378	43.2	1	--	191	1.94	3	0.02	56.8	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Linn (cont')	Vancouver Plywd.	Gas	775	88.5	1	--	392	1.94	7	0.02	116	.3
	American Can	R. Oil	895	15.3	107	1.60	68	1.94	10	0.15	20.1	.3
	Crown Zellerbach	Gas	130	14.8	1	--			1	0.02	19.4	.3
		Wood	73000	100	36.5	.08	36.5	.08	438	1.00	131	.3
		Oil	273	4.7	33	1.60	20.9	1.94	3	0.15	6.2	.3
	Western Kraft	R. Oil 1.3%S	2769	47.4	290	1.40	209	1.94	28	0.13	62.3	.3
		Gas	1680	192	1	--	849	1.94	16	0.02	252	.3
	Wood Burning Plants	Wood	274000	375	137	.08	137	.08	1279	0.78	493	.3
Marion	Burkland	R. Oil 1.3%S	91	1.6	9	1.28	7.1	1.94	1	0.14	2.1	.3
		Gas	1370	156	1	--	691	1.94	12	0.02	205	.3
	Boise Cascade	R. Oil 1.5%S	2509	43.0	300	1.59	191	1.94	29	0.15	56.5	.3
		Gas	1661	190	1	--	841	1.94	16	0.19	250	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Multnomah	Mayflower Farms	R. Oil 1.5%S	248	4.2	30	1.63	18.6	1.94	3	0.16	5.5	.3
		Gas	110	12.6	1	--	55.8	1.94	1	0.02	16.5	.3
	Linnton Plywood	R. Oil 1.5%S	1010	17.3	120	1.58	76.5	1.94	12	0.16	22.7	.3
	Pioneer Flintkote	R. Oil 1.5%S	1202	20.6	125	1.39	90.9	1.94	14	0.16	27.1	.3
	Union Oil	R. Oil 1.4%S	1390	23.8	150	1.44	105	1.94	10	0.10	31.3	.3
	Standard Oil	R. Oil 1.4%S	1260 1.4%S	21.6	136	1.44	95.3	1.94	9	0.10	28.4	.3
	Shell Oil	R. Oil 1.4%S	1950	33.4	211	1.44	148	1.94	14	0.10	42.4	.29
	Wood Burning Plants	Wood	143849	197	72	.08	72	.08	866	1.00	259	.3
Polk	Ore American Standard	Gas	275	31.4	1	--	139	1.94	3	-.02	41.3	.3

Table D-1. Industrial-Commerical Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Polk (cont')	Boise Cascade	Gas	315	36.0	1	--	139	1.94	3	0.02	47.3	.3
	Wood Burning Plants	Wood	140000	192	70	.08	70	.08	840	1.00	252	.3
Washington	Wood Burning Plants	Wood	13000	17.8	6.5	.08	6.5	.08	78	1.00	23.4	.3
Yamhill	Publishers Paper	Gas	1250	143	1	--	633	1.94	11	0.02	188	.3
		R. Oil 1.5%S	840	14.4	100	1.59	63.5	1.94	10	0.16	18.9	.3
	Wood Burning Plants	Wood	42981	58.9	21.5	.08	21.5	.08	258	1.00	77.4	.3
Tillamook	Tillamook VNR Co.	R. Oil 2.0%S	1050	18.0	168	2.13	83.7	1.94	12	0.15	23.7	.3
		Gas	2500	285	1	.01	412	1.94	23	0.02	374	.3
	Wood Burning Plants	Wood	26000	35.6	13	.08	13	.08	156	1.00	46.8	.3
	TOTAL			4610.9	7246		10343		9532		5926	

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Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
SOUTHWEST AQCR (#194):												
Coos	Wood Burning Plants	Exempt Wood[d] Non-Ex. Wd.[d]	102000 394000	140 540	51 197	.08 .08	51 3940	.08 1.6	343 1326	0.56 0.56	184 710	.3 .3
Curry	Wood Burning Plants	Wood	93000	127	46.5	.08	46.5	.08	558	1.00	167	.3
Douglas	Nordic Plywood	Gas	207	23.6	1	--	145	1.4	2	0.02	31.0	.3
	Drain Plywood	R. Oil 1.5%S	1560	26.8	184	1.57	164	1.4	16	0.14	35.2	.3
	International Paper Gardiner	R. Oil 1.5%S	14700	251	1750	1.6	875	0.8	74	0.07	330	.3
Jackson	Carolina Pacific Plywood	Gas	2700	308	1	.01	1079	0.8	24	0.02	405	.3
	Kogap Mfg.	D. Oil[c] 1.2%S	258	4.1	22	1.23	7.2	0.4	2	0.14	5.4	.3
	Wood Burning Plants	Wood	1378870	1889	689	.08	689	.08	3429	0.41	2482	.3

Table D-1. Industrial-Commercial Fuel Combustion Point Source Characterization

County	Plant Name	Fuel Use			Emissions							
					SO_2				Particulates			
					Existing		Allowable[a]		Existing		Allowable[a]	
		Type % Sulfur % Ash	Annual Quantity[b]	Heat Input (10^6 Btu/hr)	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu	tons/yr	lbs/10^6 Btu
Josephine	Wood Burning Plants	Wood	171820	235	86	.08	86	.08	997	0.97	309	.3
	TOTAL			2412	3271		7327		8841		5537	

[a]Allowable Emissions refers to the maximum emissions permitted by emission regulations. For fuel burning equipment operating on gas, the allowable emissions was considered to be those which would be permitted if the equipment used residual oil instead.

[b]Oil - 10^3 gallons, Gas - 10^3 MCF, Coal - 10^3 tons.

[c]Value for sulfur content was not available and was assumed to be equivalent to state average for the fuel type used.

[d]"Exempt" and "non-exempt" refer to the applicability of emission regulations. The non-exempt wood burning is constituted of plants with boilers of greater than 150 x 10^6 Btu/M heat input.

NOTES:

1. Data was extracted from information in NEDS as of 1974. Calculation and conversion of units of emission rates were facilitated by reference to "How to Convert Air Pollution Data with Seven Simple Curves," KVB Engineering, July 1974 issue of Electric Light and Power.

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APPENDIX E
AREA SOURCE ASSESSMENT

Table E-1 shows area source fuel use for the entire state of Oregon. The approximate energy values are compared for each fuel along with the percent of overall energy derived from each fuel. The bottom row entitled "all fuels, all sources" may not match totals from Appendices A, C, and D, exactly, since neither the NEDS or individual appendix totals are all-inclusive. Also fuel schedules may change from one year to the next.

Table E-1. Total State Area Fuel Use[a], Oregon

Source	COAL		RESID. OIL		DIST. OIL		GAS		WOOD		TOTAL
	10^3 tons	10^9 Btu	10^3 gal	10^9 Btu	10^3 gal	10^9 Btu	10^6 ft^3	10^9 Btu	10^3 tons	10^9 Btu	10^9 Btu
AREA SOURCES:											
Residential	10.2	235	0	0	266230	37274	27760	27760	284.6	3411	68680
Industrial	0	0	178230	24950	79770	11168	45730	45730	114.1	1367	83215
Commercial/ Institutional	2006	462	105530	14773	22350	3129	17880	17880	1.2	14	36258
AREA SOURCES:											
Total	30.26	697	283760	39723	368350	51571	91370	91370	399.9	4792	188153
% By Fuel		0.4		21.1		27.4		48.6		2.5	
AREA AND POINT SOURCES:											
Total Fuel Use	99.22	2287	400143	56016	430882	60327	157946	157946	6356.2	76166	352742
% By Fuel		0.6		15.9		17.1		44.8		21.6	

[a] Fuel use figures are taken from data in NEDS data bank as of September 1974.

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APPENDIX F

OTHER ANALYSES

The Tables F-1 and F-2 illustrate the effect on emissions of particulates and SO_2 when power plant and industrial fuel burning sources listed in Appendices C and D are allowed to emit at the ceiling rate permitted by emission regulations. It is assumed that heat input remains the same, and existing regulations are applied to gross heat input for each AQCR. It is emphasized that this table is hypothetical in that no fuel mix may exist to allow all sources to emit exactly at regulation levels. The calculations do give some insight into adequacy of existing regulations for allowing air quality standards to be achieved if a fuel schedule different from the one at present were in effect.

Table F-1. Assessment of Restrictiveness of Particulate Emission Regulations for Fuel Burning Equipment

AQCR	Fuel Burning Emissions, 1972 10^3tons/yr	Fuel Burning Emissions Projected for 1975[b] 10^3tons/yr	1975 Fuel Burning Emissions at Regulation Limit Rates[c] 10^3tons/yr	Increase in 1975 Emissions in AQCR When Fuel Burning Units Emit at Regulation Limits		Tolerance for Particulate Emissions Increase in AQCR in 1975 10^3tons/yr	Assessment of Restrictiveness of Fuel Burning Emission Regulations[d]
				10^3 tons/yr	Percentage of Total Emission Inventory 1973		
Central (#190)	3.4	1.4	2.0	.6	3.6%	3.6	Overly restrictive. Significant relaxation appears possible.
Eastern (#191)	2.3	.5	.6	.1	.7%	None	Not overly restrictive for sources contributing to area of worst air quality. Probably over-restrictive in "cleaner" counties.
Northwest (#193)	1.0	.8	17.6	16.8	210%	7.1	Not overly restrictive.
Portland Interstate (#193), Oregon Portion	9.7	3.1	6.3	3.2	3.4%	None	Not overly restrictive for sources contributing to air quality, but probably over-restrictive in cleaner areas
Southwest (#194)	8.8	4.9	5.5	.6	1.1%	2.1 but diminishing to none in near term.	Overly restrictive for attainment in 1975, but not for maintenance in near term. Regulations may be over-restrictive for cleaner areas removed from AQMA.

[a]Calculated as sum of point sources from Appendix C and D.

[b]Projected fuel combustion emissions for 1975 were assumed to be the sum of those tabulated for point sources in Appendix C and D with the following adjustment: Those sources which were out of compliance with emission regulations were assigned a 1975 level equivalent to source operation at the emission regulation limit. Emissions from area sources (Appendix E) were neglected in the assessment as they were expected to remain constant. Also zero growth was assumed to apply to all point sources.

[c]These emissions have been calculated as "allowable emissions" in Tables C-1 and D-1.

[d]The restrictiveness of the combustion emission regulations is judged by comparing the increase in 1975 fuel burning emissions caused by operation at regulation limits with the "emission tolerance" the AQCR is appraised to have (Table A-10). If the increase exceeds the emission tolerance, then it is clear that the regulations are not overly restrictive. When the increase does not exceed the emission tolerance, the regulations may be relaxed to allow higher emission rates without interfering with the attainment of federal air standards.

Table F-2. Assessment of Restrictiveness of SO_2 Emission Regulations for Fuel Burning Equipment

AQCR	Fuel Burning Emissions, 1972[a] 10^3tons/yr	Fuel Burning Emissions Projected for 1975[b] 10^3tons/yr	1975 Fuel Burning Emissions at Regulation Limit Rates[c] 10^3tons/yr	Increase in 1975 Emissions in AQCR When Fuel Burning Units Emit at Regulation Limits		Tolerance for SO_2 Emissions Increase in AQCR in 1975 10^3tons/yr	Assessment of Restrictiveness of Fuel Burning Emission Regulations[d]
				10^3 tons/yr	Pertentage of Total Emission Inventory 1973		
Central (#190)	2.4	1.5	4.7	3.2	94%	18.6	Overly restrictive
Eastern (#191)	2.8	2.5	3.8	1.3	50%	13.4	Overly restrictive
Northwest (#192)	1.3	1.0	47.3	46.3	1650%	14.5	Not overly restrictive
Portland Interstate (#193), Oregon Portion	7.3	3.2	12.5	9.3	28%	37.8, but diminishing to zero by 1977	Not overly restrictive for sources contributing to area of worst air quality, but probably overly restrictive in areas removed from AQMAs
Southwest (#194)	3.3	2.4	7.9	5.5	72%	39.6	Overly restrictive

[a]Calculated as sum of point sources from Appendix C and D.

[b]Projected fuel combustion emissions for 1975 were assumed to be the sum of those tabulated for point sources in Appendix C and D with the following adjustment: Those sources which were out of compliance with emission regulations were assigned a 1975 level equivalent to source operation at the emission regulation limit. Emissions from area sources (Appendix E) were neglected in the assessment as they were expected to remain constant. Also, zero growth was assumed to apply to all point sources.

[c]These emissions have been calculated as "allowable emissions" In Tables C-1 and D-1.

[d]The restrictiveness of the combustion emission regulations is judged by comparing the increase in 1975 fuel burning emissions caused by operation at regulation limits with the "emission tolerance" the AQCR is appraised to have (Table A-10). If the increase exceeds the emission tolerance, then it is clear that the regulations are not overly restrictive. When the increase does not exceed the emission tolerance, the regulations may be relaxed to allow higher emission rates without interfering with the attainment of federal air standards.

Table F-3. Fuel Switch Evaluation

AQCR	Source Category	Fuel Type	Projected Usage in 1975[b]				Gas Switch to 2% S. Oil, R. Oil to 2% S. Oil			
			Quantity[a]	Heat Input 10^6 Btu/hr	Emissions TSP	(Tons/yr) SO_2	Qty. Switched	Heat Input 10^6 Btu/hr	Resulting TSP	Emission Increase[c] SO_2
Central (#190)	Industrial and Commercial	Oil	17440	298	112	1041	17140	293	0	1650
		Gas	509	58	4	1	509	58	35	533
	TOTAL			356	116	1041		351	35	2183
Eastern (#191)	Industrial and Commercial	Oil	22000	377	50	2310	22000	377	0	1144
		Gas	417	47.5	4	1	417	47.5	25	435
	TOTAL			425	54	2310		325	25	1579
Northwest (#192)	Industrial and Commercial	Oil	9320	160	65	982	9320	160	0	481
		Gas	114990	13128	694	35	114990	13128	7922	128004
	TOTAL			13288	759	1017		13288	7922	128485
Portland Interstate (#193), Oregon Portion	Power Plants	Oil	8400	144	96	66	8400	144	0	1253
		Gas	2419	276	21	1	2419	276	145	2728
	Industrial and Commerical	Oil	56431	966	432	2672	56431	966	0	6388
		Gas	16791	1905	186	4	16791	1905	672	17686
	TOTAL			3291	735	2542		3291	817	27836
Southwest (#194)	Industrial and Commerical	Oil	16518	281	92	1046	16260	277	0	1507
		Gas	2907	332	26	1	2907	332	198	3059
	TOTAL			613	118	1047		609	198	4566

[a] Quantity is in units as follows: Oil - 10^3 gallons, gas - 10^9 CF, Coal - 10^3 tons.

[b] The projected usage for fuel burning sources in 1975 are the same as in those tabulated in Appendix C, and D. Growth was assumed to be non-increasing, based on non-employment trends in the State.

[c] The emissions increase due to the fuel switch is calculated by comparing the projected compliance emissions in 1975 for a given fuel type with those that occur when fuel switches are made (. . calculated by utilization of emission factors from EPA Document AP-42).